FOOD MANUFACTURE

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The Editor will be glad to consider contributions from those engaged in the Food Industry. Articles intended for publication should be of a practical nature and accompanied by photographs or drawings when possible.

The Home Bacon Industry

SOME impatience and apprehension is noticeable in trade circles by reason of the lack of complete details of the proposals submitted by the Bacon Marketing Board to the Ministries of Agriculture and Food for the post-war development of the bacon industry.

This can hardly be due to any need for secrecy on the grounds of security, but the reason may be that the authorities consider it premature to encourage discussion of aspects of the proposals which must depend on our future international trading relations.

However, from statements published by the Board, the proposals, rather than representing a comprehensive plan, appear to be more of an expression of opinion as to the main principles on which such a plan should be based. Supporting that view is the Board's point that "pig production, the bacon industry, the pork trade, and the manufacturing of pig meat, all form one industry, and no plan for one section of the whole industry can be made without having important repercussions on the other sections." They go on to suggest that a fully representative Committee should be set up to prepare a complete plan for the whole industry and say the proposals submitted are intended to assist the work of such Committee. It is interesting to note that, on somewhat similar grounds, one important association of curers, many of whose members are also interested in other sections of the pig industry, has already taken a practical step to promote better understanding of pig producers' problems by welcoming the election to its Committee of a well-known figure lately connected with the Pigs Marketing Board.

As a partial relief to the industry there are now definite indications that the increased supply of feeding stuffs being made available, and the better prices to be paid from July 2, for pigs of more suitable weights, are together going to have a substantial effect in both increasing the supply and improving the quality of bacon pigs, though they may not be expected to do so to the extent that had been achieved just prior to the war.

Yet, though the industry has other considerable problems, it is generally agreed that its vigilance is rightly directed for the present mainly towards

ensuring the means for the production of more pigs of better quality. This is especially so as it is thought probable that the present form of control must continue, whether it is liked or not, for perhaps a further two years, so that this would appear to be the only means by which each and every section of the industry can at the moment foster the industry's future prosperity.

Meanwhile, whatever their individual views on the Bacon Marketing Board's proposal to have the industry considered as a whole, the different sections of the industry are presumably at liberty to submit their own schemes to the Ministries. In this connexion, it is believed that organisations representing pig producers have already made considerable progress in formulating proposals regarding their interests, particularly as concerns the pricing of pigs.

But having settled with producers the pricing of the raw material, the problem of finding an acceptable system of distributing it to manufacturers, etc., is likely to be a formidable one; and this must surely apply to all industries where raw material prices are to be fixed. Yet the solution or otherwise of the problem is, it is suggested, likely to have an important influence on the major issue as to the pros and cons of the nationalisation of industry, and it is therefore worthy of careful study.

Ice Cream Trade Hit Again

The reductions in the allocations of ingredients to ice cream manufacturers have already resulted in the lowering of the quality of the products made by a large number of firms, and the decline in palatability and nutritive value will become still more pronounced during the next few months.

The reduction in the fats allocation is from 80 per cent. to 70 per cent. of datum usage in the case of firms that receive their margarine on that basis. This is equivalent to a reduction of 12½ per cent. in the quantity actually allowed to a manufacturer.

Small firms that have, since April 1, received an allocation of six parts of margarine to every twenty parts of sugar are also subjected to the cut of 12½ per cent. in the actual quantity of margarine allocated to them. The decision to reduce the allocation was not made, however, until after these firms had received their margarine for the eight-week period ending on July 21. As the cut is effective in all cases from May 27, these manufacturers will suffer two cuts of 12½ per cent. each in the next eight-week allocation period.

The supply position in regard to skimmed milk powder is so serious that allocations are to be suspended at the end of the present allocation period on July 21. This decision caused little surprise to people in well-informed circles, and there is little hope of any further allocation being possible during 1945. This decision means, of course, a return to wheat flour mixes. The Ministry of Food has advised the trade, however, to eke out their supplies of skimmed milk powder by using during each of the next four allocation periods one part of skimmed milk powder and three parts of wheat flour. In this way a manufacturer would be able to use a little skimmed milk powder in his mix throughout 1945, but when his supply of powder runs out he will be obliged to revert to the wheat flour formulae of 1941 and 1942 when the use of milk was prohibited in ice cream.

As the sugar allocation remains at 60 per cent. of datum usage, manufacturers will be able to produce the same gallonage of ice cream as hitherto, but the Minister is not yet certain whether a cut in the sugar allocation can be completely avoided. Should a cut become necessary, food manufacturers will be the first category of customers to be affected.

Allocations of skimmed milk powder to manufacturers of ice cream powders also cease at the end of the present eight-week period. Some of these manufacturers, however, had already received six months' supply in advance and had mixed their powder before the official decision was made.

Licensed caterers who receive ingredients on the basis of "tea meals" will be able to make ice cream as hitherto. They will be the only people able to use milk or milk products in their mixes.

Famine in Oats

A famine in oats is likely to cause the mills in North-east Scotland to close down shortly. Grain merchants and millers are confronted with one of the most difficult supply positions they have yet been called upon to face. Scotland produced some 800,000 tons of oats last year in addition to about 170,000 tons of wheat, but while oats, though lower in quality than usual, have been snapped up eagerly since the first threshings last autumn, wheat has been a slow trade and in the past few weeks has been rather a drag on the market.

Flour millers do not like Scottish wheat. It is too soft and too high in moisture for their purpose; and when, as is the case now, they have good stocks of imported grain, they will not look at locally grown supplies. They bought little or none at all before the war. The great bulk of Scottish wheat then was used for hen feeding, and that is where it would go now but for the ban on the sale of millable wheat for stock feeding. Merchants and farmers with stock on their hands cannot cut the price and get clear. There are fixed control prices—15s. 4d. per cwt. for millable and 12s. 8d. for non-millable—and it is illegal to sell at more or less than these rates.

Oats are in a different position altogether. There was a bad harvest, and production was down by nearly 50,000 tons on 1943. Mills could not get

nearly enough oats of good milling type owing to the poor condition of the crops following the long wet autumn. Now the supply of oats of all descriptions is practically exhausted. Millers in the north-east say that they will be forced to close down shortly until September. This is unusual. The normal procedure—and it would certainly be carried out this year if grain could be got—is to carry on milling throughout the twelve months, with a week's break at the Trades Holiday for overhaul.

Dried Egg Precautions

The Ministry of Food have issued an Order (The dried Egg [Control of Use] Order [S.R. & O. No. 627 of 1945]) which took effect on June 11 to control the use of dried egg in specified manufactured foods with the object of avoiding potential cases of food poisoning.

The Order prohibits the sale of wet mixtures containing dried egg intended for use in the manufacture of ice cream, synthetic cream, and bakers' cream filling. It also prohibits manufacturers from using dried egg at all in making these foods except under licence, and the licences to be issued will prescribe how the egg is to be treated in the course of manufacture. At the moment, no licences will be issued to authorise the use of dried egg in bakers' cream filling until further notice.

The Order also requires firms who sell a dry mixture intended for the manufacture of the specific foods to put a statement on the label in the prescribed form if the mixture contains dried egg.

Domestic consumers have been advised all along, both on the package and from time to time in "Food Facts" advertisements, not to keep reconstituted dried egg for any length of time, and in view of the absence of food poisoning cases traceable to the substance, it seems that such warnings have been effective, and it is hoped that the same will apply in the case of products made on a larger scale.

£20,000 Plant Opened at Fraserburgh

The Herring Industry Board's £20,000 experimental herring freezing plant which began work in Fraserburgh on June 11 was secured supplies by the intervention of Mr. F. A. Bell, chairman of the Board, after he had appealed to herring fishermen not to withhold surplus herring for industrial processing or deny the Board herring for experimental freezing. The Board, Mr. Bell told Fraserburgh fishermen, was prepared to lose £10,000 on the first year's work, despite the fact that it had not a great deal of money to play with. For that reason they were asking fishermen to co-operate by agreeing to supply 150 cran per day at 55s. for freezing, and to pay a levy of 3d. per cran towards the experiment. The experiment would, if successful, prove a greater benefit to the catcher than to the buyer. He also urged that, to make some use of any subsequent gluts, surplus fish should be sold at 10s. per cran for manure manufacture.

Commenting on the future of the industry, Mr. Bell urged that something should be found to take the place of the cured herring trade, for which prospects did not look too bright. With a view to exploring, extending, and developing canning, his Board was prepared, he said, to establish and maintain an experimental canning plant at an early date so that new methods, new recipes, etc., could be developed to the advantage of the industry.

Criticising the fact that on no Tuesday was it possible to get fresh herring anywhere in the summer and that in the winter months there was seldom enough herring to go round, he thought the only solution was the use of quick freezing methods. After the chairman of the Board had placed these views before Fraserburgh fishermen, they reversed their decision for the second time and assured the Board that they would co-operate as required.

Dairy Machinery

Milk manufacturers and processing dairies will be able to obtain new plant and equipment with considerably less trouble, and probably with less delay, as a result of the simplified licensing control system introduced by the Board of Trade, in co-operation with the Ministry of Food, on June 1.

Under the new procedure purchasers are no longer required to obtain buying permits. The Board issues to dairy engineers bulk licences authorising a firm to supply machinery up to a given value related to the capacity expected to be available over a specified period. In addition, there may be particular orders sponsored by the Government warranting special treatment which will be covered by the issue of individual licences, and dairy engineers will be required to give preference to these orders.

So far as is possible, selection of the customers to be supplied in the United Kingdom will be left to the dairy engineers, but as the demand for such plant is likely to be in excess of the supply for a considerable time, the Ministry of Food will arrange for the larger orders to be executed in accordance with an order of priority.

The Board of Trade wishes the export trade in milk plant and equipment to be developed while the requirements of the home market are being met; and as additional capacity becomes available for civil use in the engineering workshops, the Board hopes that a proportion of it will be allocated to the fulfilment of export orders.

Every dairy engineer has been asked by the Board of Trade to complete a questionnaire showing, *inter alia*, the approximate value of the production they expect to accomplish during the next

six months (*a*) for United Kingdom buyers, (*b*) for export, and (*c*) for repairs and reconditioning of machines at home. A list of all orders for individual machines exceeding £500 in value has also to be given.

The Board will be prepared to consider requests for supplementary bulk licences as increased capacity becomes available; and in any case the Board will expect to issue further bulk licences on the expiry of the previous ones.

Fluorine in Fish Pastes

Sundry evidence as to the effect of fluorine in combating caries is given in a communication by Warren Harvey, of the R.A.F. Physiology Laboratory, to *Nature*, **155**, 175 (1945). He quotes a recent investigation on the Tyneside, the results of which suggested that the delayed onset of caries in a section of the population may be due to the fact that the water supply to this particular area contains 1·4 parts of fluorine per million.

In view of the fact that the Eskimos of the Pacific north-west have superb teeth and that their diet includes soft fish bones which contain 250 parts per million of fluorine, five well-known brands of fish paste were analysed and there was found a fluorine content ranging from 3·1 to 8·9 parts per million. As it has been suggested that the diet should contain 1 milligram of fluorine per day for the prevention of caries, this being provided by 2½ quarts of milk, or 3 grams of beef bone, or a quarter of a pound of fish paste (containing about 8 parts per million), the author feels that "there are probably few people who would go to the extreme of taking daily 1⅓ jars of fish paste in the hope of avoiding the necessity of conservative dental treatment," and suggests that they seek a more suitable source of fluorine.

Virus-Free Potato Production

The very considerable success which has accompanied efforts by the National Institute of Agricultural Botany, the Department of Agriculture for Scotland and the two growers Wilfrid Appleyard and John Ramsden from Yorkshire, in growing considerable stocks of virus-free seed potatoes in Islay, is shown by the first year's figures.

From the small quantity of seed originally given the growers on a trial basis, 204 tons have been grown on the island. Of these, about 50 tons have been given by the Department to True Stock Growers of Scotland. A similar quantity has gone through the Irish Department to Northern Ireland growers. That leaves about 100 tons for use in Islay, which will be supplemented by about 15 tons from the propagation station, giving Islay a seed tonnage of roughly 120 tons.

About 140 acres in the Cornabus Valley is being used, and it is expected that by autumn there will be about 500 tons of seed for distribution by the sponsors.

The prospect of an Islay Seed Growing Association is mooted. The value of the island, which is wind-swept and free from green-fly, as a virus-free, non-infected area, was pointed out to the two Yorkshire farmers by the Department of Agriculture for Scotland, and their advice has been amply justified.

Buffalo Beef

With the cut in the meat ration, those of us "possessed with thoughts of the kitchen," as Cicero put it, who sigh for the beefsteaks of bygone days, may yet take heart with some news from Canada. In that country, according to the report, the buffalo allied with the domestic cow has produced a new hybrid called the "cattalo." It is a source of flesh appealing more to the stomach than buffalo meat, of prime cuts which will offset the cut made by Colonel Llewellin by providing the harried housewife of Britain with the equal of best beef for her working husband, and will seek to prove the old proverb that "New meat begets new appetite." According to the *Manchester Guardian* the idea is not new, however; for not only did Colonel Charles Goodright have a big herd of such animals on his Texas ranch, but C. J. Jones, hero of *Buffalo Jones's Forty Years of Adventure*, also claimed to have introduced the "cattalo" as an offspring of "cattle" and "buffalo" which thrived well on prairie grass.

The new claim comes, incidentally, on the centenary of birth of William Frederick Cody, otherwise "Buffalo Bill," that Wild West showman who competed with "Lord" George Sanger by becoming the "Honourable" William. Buffalo Bill was first a "cavvy boy"; then rider to the Pony Express; then scout against the Sioux; next a cavalryman who killed the Chief Yellow Hand at Indian Creek; and finally a man honoured by a tomb blasted from the solid rock of Lookout Mountain. But he comes into this story, into the world of food, by being the man who supplied buffalo meat to gangs of workmen engaged in cutting new railroads in the West—hence his popular name. And the meat had none of those tender influences of the domestic cow now to be introduced. Tough buffalo steaks for tough guys: such was the maxim for navvies who knew nothing of those finicky protein products of a modern chef. One final point concerning the cattalo is that its woolly coat yields a fibre which "can be turned into stockings as fine as silk." Or so continues the description, to which our Manchester contemporary adds the suggestion that perhaps it "swims like a duck (and will therefore make a very good sea-serpent or Loch Ness Monster), takes fewer points than a rice pudding, and the glue from its hooves may be used for waterproofing submarines."

Jam Manufacture

PART IV

GEORGE RAUCH

DURING the short fruit season only very few factories are capable of converting all the incoming fresh fruit into finished jam. That not used for this purpose is made into fruit pulp, which is an intermediate product. Apart from the purely technical limitations of most plants to cope with large quantities of fruit in short periods, there are weighty economical reasons for pulping, one of which is the necessity to provide employment throughout the whole year and another is to avoid the considerable capital expenditure involved in storing the finished jam for a long period. The higher price for fresh fruit grade jam only partly compensates for this, as under normal circumstances the capital involved can be turned over several times during the year. Another reason is that pulp has a stabilising influence on the price of jam. In seasons of glut, when fruit is available at a low price, it is possible to preserve large quantities of pulp, which can be stored for another season to balance the price of fruit during a year of possible scarcity. The same applies, of course, for the grower or fruit merchant, who may find in the production of pulp a convenient instrument for stabilising prices and avoiding severe losses, a fact which so far has not been sufficiently appreciated.

Preservation Methods

Before discussing the various methods of preservation it must be emphasised that no method, however perfect, is capable of substituting fresh fruit in the manufacture of jam. It should be the aim of every jam producer to manufacture as much fresh fruit jam as technically or economically possible, and it is with this purpose in mind that all modern production systems are devised. Some fruit varieties are more, some less, suitable for different methods of pulp preservation. Citrus fruits, raspberries and black currants, for instance, retain their natural flavour to a high degree when preserved with SO_2, while strawberries and blackberries lose much of their subtle flavour.

Two methods of preservation are mainly used:

1. Preservation by chemical methods.
2. Preservation by sterilisation.

The first method is cheaper and simpler; the second is preferable from the purely technical point of view, but is more expensive, and requires specially equipped factories if used on the large scale.

Preservation by Chemical Methods

The use of chemical preservatives is limited by legal regulations. These vary considerably not only in different countries but also within the British Empire. In Britain and British India the only preservative permitted in fruit pulp is SO_2, and the limits are:

Cherries up to 3,000 p.p.m.; strawberries and raspberries up to 2,000 p.p.m.; other fruit up to 1,500 p.p.m.

In jam, 40 p.p.m. is tolerated, and the latter figure has been increased in 1945 to 100 p.p.m. as a temporary war-time measure; in Canada, preservatives are permitted in second and third grade jams up to specified limits if declared; the U.S.A. tolerates SO_2 and benzoate of soda if declared; whereas in Australia and New Zealand preservatives are prohibited altogether.

The following groups of chemicals most frequently used for preserving purposes are Sulphites (sulphurous acid, sodium bisulphite and sodium pyrosulphite); Benzoates (benzoic acid and benzoate of soda); and Formic acid.

Preservation with Sulphites

Sulphurous acid and its salts are far the most commonly used preservatives for fruit products. Their popularity is well deserved, as SO_2 evaporates during boiling and leaves only minute traces of sulphur in the finished product. It has a strong bleaching effect on fruit products, but the natural colour is not all destroyed and is partly restored on boiling. Another great advantage is in the fact that SO_2 and its salts have not an adverse influence on the setting properties of pectin; furthermore, the firmness of the whole fruit is not affected.

Sulphurous acid can be used either in aqueous solutions of 6 to 8 per cent. concentration or in dehydrated form of 100 per cent. strength. The latter is available in steel or iron cylinders and escapes of SO_2 gas. Using concentrated SO_2 has the advantage of saving carriage and makes possible the use of fresh solutions. If used in this concentrated form it can be directly introduced into the pulp or it is possible to produce sulphurous acid of 6 to 8 per cent. concentration on the premises. Sulphur dioxide is readily soluble in water, and small quantities can be simply produced by placing a vessel containing 94 lb. of water on a scale and introducing the gas until the weight of 100 lb. is reached. For large quantities the apparatus shown on Fig. 1 has proved successful.

Two airtight wooden tanks or casks (A) and (B) are connected by a lead or rubber tube. The outlet (a) can be closed either by a cock or, if a rubber pipe is used, by a steel clip. The perforated coils (b) and (c) are placed on the bottom of the vessels.

The first coil (b) is connected with the cylinder containing sulphurous acid, and the second coil (c) conducts the gas which has not been absorbed in the vessel (A) to the container (B). An opening (d) in the top vessel serves for the intake of water, and the finished solution is emptied through the outlet in the bottom container (d). Both vessels are filled with water and the compressed gas is introduced until the solution in the bottom vessel attains a specific gravity of 1·030. After being emptied, the contents of the vessel (A) are transferred to the container (B) and the top vessel is refilled with fresh water. It is essential to keep the preservative in a cool place and to use it in a fresh state, as sulphurous acid quickly evaporates. As iron is affected by the acid, all utensils in contact with it should be of wood, lead, glass or rubber.

Preservation with Sulphur Dioxide

It is possible to preserve fruit with SO_2 either raw or cooked. Strawberries, raspberries and blackberries are usually preserved in their raw state, whereas gooseberries, black and red currants, plums, damsons, and most other stone fruits are preferably cooked prior to preserving, as cold preservation is liable to toughen their skins. About 10 to 13 lb. of sulphurous acid of 6 per cent. strength is used per 40-gallon cask; this amount equals approximately 1,500 to 2,000 p.p.m. If used in cooked pulps, part of the preservative is evaporated and the pulp contains less than the legal limit.

Containers

Casks of approximately 40 gallons capacity are the most suitable containers for pulps preserved by chemical methods. Smaller casks are uneconomical and larger ones difficult to handle. Glass containers and large concrete tanks are used, but are of little practical value. Oak casks are in the long run the cheapest. Second-hand syrup casks and soft-wood containers have a comparatively short life, and the loss and damage caused by leakages offsets the difference in price.

Casks for pulping purposes must be absolutely clean and sterile. Prior to pulping, the casks should be unheaded and filled with a boiling solution of soda of 1 per cent. strength and left for 24 hours. The next day the casks should be rinsed with water to which 5 per cent. of sulphurous acid of 6 per cent. concentration has been added. The soda and acid solution can safely be used three or four times for the same purpose.

Pulping Methods

Strawberry pulp is an international trading article. For trading purposes there are three grades:

For Grade I, not less than 80 per cent. of the fruit should be of firm consistency. All strawberries should be of good shape, evenly coloured and about full-ripe. In Holland, which was one of the most important export countries for strawberry pulp, the variety *Jukunda* was most frequently used for Grade I.

Grade II should contain at least 50 per cent. fruit of firm consistency, and the strawberries should be ripe and evenly coloured.

Grade III may contain soft ripe and over-ripe strawberries, but the fruit should be fresh and healthy prior to pulping. This grade is usually used for jam mixtures. If possible, strawberries should be pulped on the plantation to avoid damage in transit. For the preservation the procedure is usually as follows:

For a 40-gallon cask use 3 cwt. of strawberries and a solution of 10 lb. of SO_2 in 3 gallons of water. Half of the preserving solution is placed in the cask and the clean, plugged, and stalked strawberries are added. The rest of the solution is poured in at intervals in order to ensure an even mixture with the fruit. The strawberries should not be stirred or they will be damaged. The casks should be headed up before quite full, rolled, and finally filled up through the bung-hole. The firmness of the strawberry pulp can be improved by replacing part of the sulphurous acid by the same quantity of calcium bisulphite. The amount added varies with the firmness of the fruit, but the proportion is approximately three parts calcium bisulphite to seven parts of sulphurous acid.

Raspberries, loganberries, and **blackberries** are usually preserved in their raw state and the procedure is much the same as with strawberries, except that no additional water must be used. Blackberries are sieved for seedless Bramble Jam. It is advisable to boil the blackberries prior to

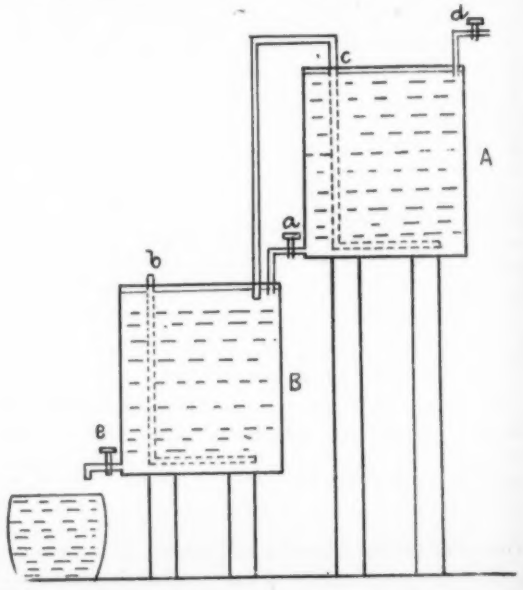
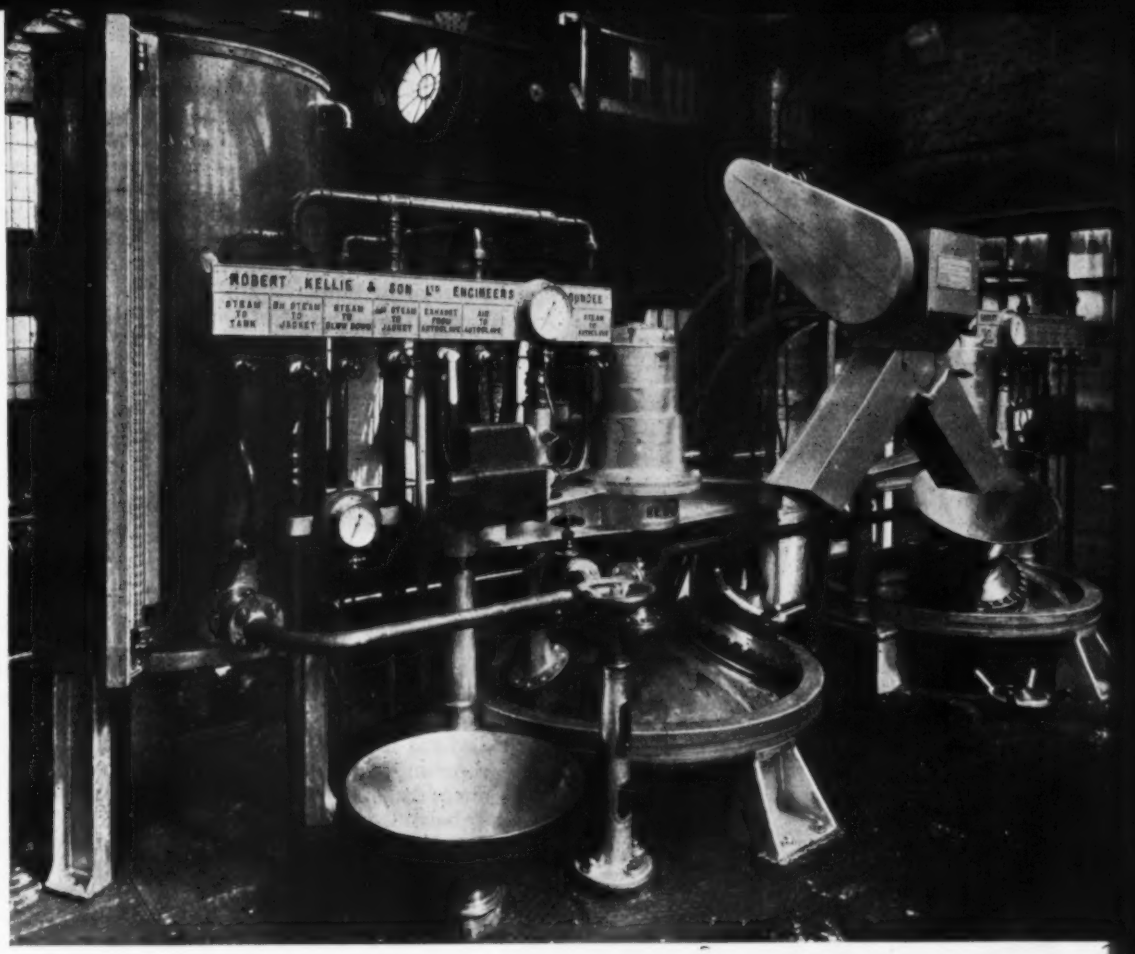


Fig. 1.



Kellie-Yates pulping method. The two autoclaves and fruit diverter leading from elevator. On left, calibrating and heating tank for motor.

Courtesy of Robert Kellie and Sons, Ltd.

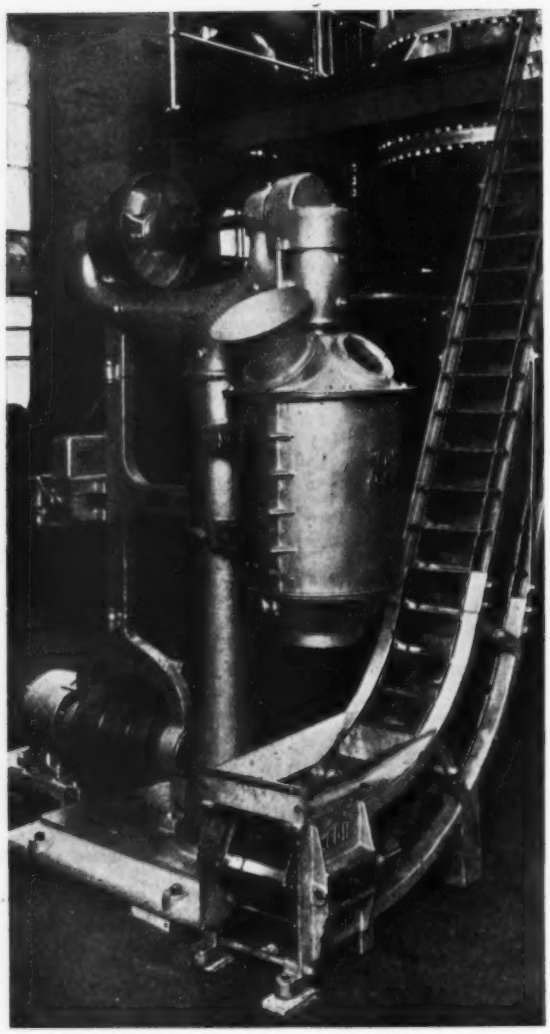
sieving for not less than 20 minutes. If boiled in pans or autoclaves it is necessary to add the equivalent of water which evaporates during the boiling. If vessels without steam coils are used no further water must be added.

Gooseberries have to be cooked prior to preserving after being topped, tailed, and washed in the gooseberry snibbing machine. If boiling pans or autoclaves are used, 5 to 7 per cent. of water should be added. The fruits are cooked until their skins burst, and are then mixed with the preservative and filled as hot as possible. No addition of water is necessary if cooking is carried out in vessels with steam coils, but great care must be taken not to over-cook the fruits.

Black and red currants are cooked in the same way as gooseberries, after having passed through the strigging machine. The fruit is brought to boiling point under continuous stirring. The skins of the currants should be broken, but the fruit should keep its consistency and must not be allowed to disintegrate. It is essential to mix the preservative evenly with the pulp. The casks should be completely filled—no air space being left. Black currant pulp should be cooled down to 160° F. prior to filling. Red currants are often preserved in their raw state, or boiled with stalks and filtered for jelly making.

Stone fruits are usually cooked until soft and preserved either with stones or sieved. If cooked in pans or autoclaves, 5 to 8 per cent. of water may be added. For the sieving of plums a coarse sieve should be used. In the case of acid **cherries** cold processing is occasionally employed; the results vary with different varieties; however, complaints about tough skins reoccur.

The procedure for the preservation of **apples** is similar to that for stone fruit. The cooking and sieving operation should be as short as possible in order to avoid the discoloration of the pulp. If boiled in pans or autoclaves, 5 to 10 per cent. of water should be added, but if boiled in vessels with



Vertical cutting machine and gooseneck bucket elevator by which latter the sliced fruit is raised to the autoclaves.

Courtesy of Robert Kellie and Sons, Ltd.

steam coils the amount of water required is considerably less. It is important to fill the pulp as quickly as possible and to bung down immediately.

The preparation of **citrus fruits** prior to pulping varies considerably. Usually dummies and peel are cooked separately. The dummies, after being boiled for at least 20 minutes, are sieved and mixed with the cooked peel, and the preservative is added at this stage.

Storage of Pulp

The importance of suitable storage facilities for pulp preserved with SO_2 cannot be overestimated. Considerably more damage and waste is caused by faulty storage than mistakes in the process of preservation. Whenever possible cellars should be used for sensitive pulps, such as black currants. All other pulps should be stored in cool and well-aired rooms liable to as little change in temperature as possible. If special storerooms are not available, simple sheds will give some protection against the weather. The practice of storing pulp in open yards should be avoided. The cost of temporary sheds is offset by the saving and preservation of casks and material. If, however, storing in the open is unavoidable, the casks should at least be covered with waterproof sheets. It is important to inspect the pulp periodically, as SO_2 evaporates and has to be replaced from time to time. Serger recommends the quantities of SO_2 of 6 per cent. strength to be added for different periods. See Table 1.

Every cask of pulp should bear a label with the following information: (1) Variety; (2) Date of pulping; (3) Gross weight, Tare and Net Weight; and (4) General remarks.

The same information should be entered in a card index, giving additional information concerning the dates of inspection. As soon as the cask is used the card is cancelled and filed for further reference.

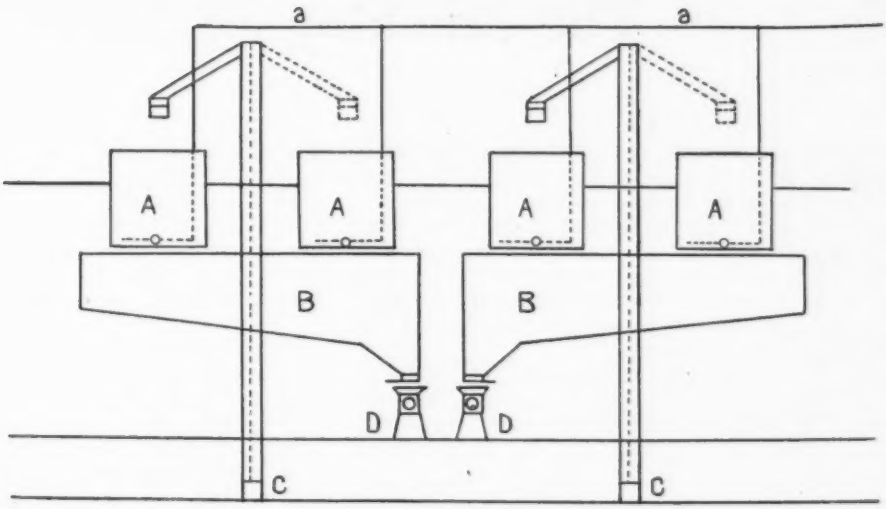
No special plant is necessary for cold processing of whole fruit. For the sieving and cooling of pulp the same principles are applied as for jam production. Gravity should be made use of when possible. The plant consists of cooking vessels, sieving machines, and elevators. Cooking vessels range from simple wooden casks with perforated steam coils to modern autoclaves.

Fig. 2 shows, diagrammatically, some units of a pulping plant. It consists of four cooking vessels

TABLE 1

ADDITION OF SO_2 FOR DIFFERENT PERIODS

Pulp.	*For 100 Kg. of Pulp.*		
	3 Months.	*6 Months.*	*1 Year.*
Cherry (sieved)	1·0 litre	1·5 litre	2·25 litre
Red currant	1·1 ,,	1·65 ,,	2·45 ,,
Apple (sieved)	1·2 ,,	1·8 ,,	2·65 ,,
Strawberry (sieved)	1·3 ,,	1·95 ,,	2·85 ,,
Raspberry (sieved)	1·4 ,,	2·1 ,,	3·05 ,,



Pulping Plant.

Fig. 2.

(A) each of approximately 3-cwt. capacity, fixed on an elevated platform. They are fitted with perforated steam coils (a). The fruit is brought up by gooseneck elevators (C), and the cooked pulp is discharged into reception tanks (B), from which in turn the slightly elevated pulping machine (D) is fed. While one battery of two pans is being filled, the fruit in the other units is cooked and discharged. In this way it is possible to maintain a continuous operation. The cooking time of a boil is 10 to 20 minutes, and the production capacity of this plant is 12 to 14 tons a day. This plant can be combined with the jam production lay-out for fresh fruit jam manufacture. This method of pulping is also otherwise adaptable. For larger outputs more units are necessary, and it is also possible to replace the cooking vessels by autoclaves or double-jacketed pans.

The Kellie-Yates system, for instance, uses a cutter in order to slice the fruit prior to pulping. From the cutting machine a gooseneck elevator carries the sliced fruit to a battery of steam-jacketed autoclaves fitted with a stirring arrangement. The autoclaves are usually discharged by means of compressed air to the filter or sieving machine.

Preservation with Other Compounds

Benzoate compounds with various trade names are on the market. The most frequently used are benzoic acid and benzoate of soda. The preparation of fruit for pulping is the same as described before for SO_2. For 100 lb. of pulp, 70 g. of benzoate of soda should be added and well stirred. The drawback is that the preservative remains in the finished product.

Formic acid is an excellent preservative for fruit juices, but is less suitable for pulp. The amount necessary for preservation is 200 g. of acid of 50 per cent. concentration for 100 lb. of juice or pulp.

Preservation by Sterilisation

This method is widely used, particularly in countries where chemical preservation is prohibited. The principle of this method is the same as for canning. The fruit is prepared in the usual way, packed into cans, covered with water or weak sugar solution, exhausted, seamed, and sterilised. Containers of various sizes are used; most frequently 5 kg., 3 kg. or 1 gallon tins. The advantages of this method are obvious enough—the pulp does not contain preservatives; it can be stored for longer periods; and the consistency of the whole fruit is better maintained. The drawbacks are high costs and double handling. Moreover, the container cannot be used again, and well-equipped plants are necessary to deal with large quantities of perishable fruit in short periods. Many pulp varieties—as, for instance, Spanish and Californian apricots, pineapples, Tasmanian black currants, and American sour cherries—have an established market in cans.

The following table shows the time of sterilisation for 5-kg. tins:

Pulp.	*Temperature. Degrees Fahr.*	*Boiling Time. Minutes.*
Apple	212	40
Plum	212	50
Greengage	212	45
Gooseberry ..	212	40
All other fruits ..	212	40

(*To be continued*)

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The Smoking of Meat

T. HOWARD.

MAN has practised the art of drying and smoking meat throughout the ages, finding that, along with the use of common salt, it was the most practical means at his disposal for its preservation or partial preservation. Other means have been developed in more recent years, but the smoking of meat, especially bacon, is as popular as ever, because, in addition to preservation, flavour and appearance are enhanced.

As far as this country is concerned, bacon, for all practical purposes, is the only meat which is extensively smoked, and it is proposed here to discuss it, as the principles are the same for all meats.

Progress in Bacon Production

Until about the middle of the nineteenth century bacon could only be cured during the cold weather. About 1850, curing began to be carried on all the year round by means of cooling the curing cellar with ice. With the advent of mechanical refrigeration in 1877 and the superseding of ice by 1880, a milder-cured bacon was produced, resulting in an increased demand. In 1906 very nearly 7,000,000 cwt. of bacon and hams were used in this country, and by 1916 nearly 9,000,000 cwt. were sold. It is computed that nine-tenths of the bacon sold in the South of England is smoked; in the Midlands three-fourths is smoked, while in the North of England and Scotland about one-half. It will thus be realised that several million cwt. of green bacon is smoked per year in this country alone.

With the advent of the desire for more scientific control, and consequently the desire for greater uniformity, the whole question of drying and smoking has been given greater attention. For this control to be effective it is necessary that the meat should be—

(1) Dried evenly; (2) preserved whilst drying is proceeding and after drying for a further reasonable period; and (3) given the requisite flavour.

Of these, perhaps the first is the most difficult in practice, for success when sawdust or smoke from sawdust is being used means the attainment of preservation and flavour. The basis of smokehouse practice is drying, which depends on relative humidity, temperature and air velocity in combination to bring about the necessary conditions.

Methods of Smoking

There are two distinct possible methods of smoking. In one the meat to be smoked is suspended directly over the smouldering sawdust, and in the other smoke is generated in a separate chamber and passed over the meat by ducts and other mechanical means. The second method is, however, not commonly practised for meat smoking in this country. The first method is cheap to operate, but requires skill and judgment, and even in the hands of a very experienced operator uniform results are not always obtained.

The smoke stove is usually a rectangular brick shell, the superficial area of which is about 81 square feet and height about 30 feet, although some stoves are proportionately larger. There are no windows, and iron bars are built in at intervals so that the green bacon can be suspended about 13 feet above the floor. If more than one tier is desired, then more bars are built in order that the bacon when hanging clears the tier immediately below. Sliding doors with ventilator slots are fitted at the bottom of the stove, and at the top the roof slopes to a central outlet, which is fitted with a shutter type of ventilator. This ventilator can be regulated according to the prevailing conditions during smoking, while the slides on the door can be operated to regulate the flow of ingoing air.

Types and Use of Sawdust

Sawdust from hard woods is used for smoke generation although soft wood sawdust is used extensively, but such wood as pine is unsuitable because of the presence of aromatic volatile substances.

The sawdust is spread over the concrete floor of the stove to a depth of about 6 ins. and is ignited round the edges. A slow and steady smouldering should take place, but the sawdust will need replenishing occasionally, as about 72 hours is required for satisfactory smoking. Much of the success in the operation of this type of stove depends upon the operator, for he must arrange, with the means available, the control of humidity, temperature, and air velocity.

For instance, if the sawdust contains less than about 30 per cent. moisture it may burn too rapidly, and a consequent undesirable rise in temperature may result. This in turn melts fat out of the cell envelope of the bacon and has the effect of giving a soft oily fat, which is most undesirable. There is also undue loss of weight through shrinkage. The average percentage loss of moisture in the bacon due to smoking is normally about 7 per cent.

If the moisture in the sawdust is above 35 per cent. the fire is sluggish, the temperature of the stove will not rise to the desired height, and the humidity will be such that smoking will not take place effectively.

Temperature and Humidity

A suitable temperature for smoking bacon is for the smoke to be about 85° F.

A fairly satisfactory method of temperature recording would be to place thermometers among the bacon on the upper and lower bars. Unfortunately it is impracticable for an operator to examine these thermometers while smoking is taking place, because the smoke causes the eyes to water. It is therefore more usual to place a thermometer in an accessible position a few feet above the sawdust, and from the temperature recorded can be judged the heat given off which will produce a suitable temperature in the upper part of the stove. It is found that a fall of about 10° F. occurs from a point a few feet above the sawdust to the first layer of bacon.

The humidity in the stove is greater at the commencement of smoking, but this is regulated by making use of the ventilator slots in the doors.

Smoke Generation in Separate Chamber

In the second method, smoke is generated in one chamber and conveyed over the meat in a second chamber by means of fans and ducts, the second or smoking chamber being maintained at constant temperature by thermostatically controlled steam or electricity supply. This method is probably highly successful with thin pieces of flesh, where the drying and smoke penetration would be fairly rapid, but some modification may be necessary where several hundred pieces of meat varying in thickness from about 6 to 1½ ins. are handled. For instance, as much as 140 to 150 gallons of water may be lost in the form of vapour during the smoking of 300 sides of bacon, and the disposal of this vapour may present difficulty. In this case perhaps a preliminary drying in the second controlled chamber might be possible, as in the present-day practice drying appears to take place before the smoke becomes effective. With these methods of controlled drying and smoking it should be possible to control shrinkage loss and also obtain the rich brown colour so desirable without overheating the meat. Attempts are also being made to work with conditioned smoke of known percentage relative humidity.

There are three aspects of the problem of preservation to be considered—namely: (*a*) Exterior preservation; (*b*) interior preservation; (*c*) rancidity.

Exterior Preservation

Exterior preservation is brought about by the drying of the surface of the meat and, to a lesser degree, by the preservative or antiseptic action of some of the products of combustion derived from the wood. Among these, formaldehyde is probably the most active constituent, although the amount present in the smoke is small.

Composition of Smoke

The composition of the smoke from burning wood varies with the temperature of the combustion, the volume of air present and the nature of the wood. The literature on this subject is rather meagre, but Pettet and Lane,[1, 2] experimenting with oak sawdust and chips and using a semi-technical apparatus, were able to collect the whole of the products of combustion and were thus able to divide the substances found into formaldehyde, higher aldehydes, ketones, formic acid, acetic and higher acids, methyl alcohol, dissolved tar, and water.

Under different conditions of control of the smouldering wood, the percentage of formaldehyde was found to vary from about 0·06 to 0·24. Much of this would pass out of the smokehouse with the water vapour.

Callow[3] found formaldehyde in samples of bacon and ham purchased in the open market, the amounts present being as follows:

Ham, smoked raw ..	4·0 to 15·0 parts per million
Ham, smoked cooked	0·5 ,, ,, ,,
Bacon, smoked ..	30·0 to 50·0 ,, ,, ,,
Bacon, unsmoked ..	nil

Curing Processes

It is the common practice to salt-cure most meats which are to be eventually smoked. While this curing process is going on the meat is held at 40° F., so that the desired flavour can be produced and the salt can be fairly evenly distributed throughout the lean of the meat. During this storage, dependent on several factors, quite a growth of micro-organisms can result on the surface of the meat. Reference is made to W. M. White[4] and his co-workers, who examined sides matured for 5 or 6 days at 30° F. and 40° F. Some pieces were smoked in a commercial smokehouse, others were held for a further 10 days at 30° F. They found that on samples smoked after maturation a mean logarithmic count of 5·4 was reduced to 1·5, and on samples smoked after storage at 30° F. for a further 10 days the reduction was from 5·6 to 1·9. Smoking was also effective in retarding surface growth during storage. Visual examination of the product at the time of sampling confirmed the above results.

Unsmoked bacon became slimy and in instances definitely spoiled after 18 to 39 days' storage at 14° F., whilst that smoked was in good condition with respect to both fat and lean even after 60 days.

Another problem is one of mould growth, which can only take place on the exterior portions. In this case everything depends upon the humidity, methods of storage, and cover protection. In normal practice, smoked meats, unless they are considerably dried and smoked, are sold fairly quickly, but unless they are kept under correct conditions of humidity, mould growth will take

place fairly readily in spite of the benefits derived from drying and smoking.

Interior Preservation

Exterior preservation without interior preservation would be of no avail and may be compared with a can of insufficiently heated foodstuffs which, although heated sufficiently on the outside, goes bad because the centre portion has not been sterilised. Meat while being smoked may become warm even in the centre, and this is very conducive to bacterial growth and consequent spoilage. Therefore it is most essential that curing should be carried out before smoking can commence. Uncut pieces of meat, similar to sides of pork butchered ready for bacon production, contain relatively large numbers of bacteria on the surface, but the interior contains relatively small numbers—no more than a few hundred per gram of meat. As temperature control is practised in curing establishments, the growth of micro-organisms at cellar temperatures of 40° F. is very slow, especially in the presence of salt. Again, conditions inside and under the surface of meat are not ideal for the growth of aerobic micro-organisms, and as the majority of anaerobic organisms are spore bearers the opportunity for them to become vegetative and consequently active is remote. This is all provided the fresh meat is sound before curing, as it should be. This is well illustrated by the following bacteriological and analytical results obtained from different samples of cured hams whose age was at least 5 weeks from the commencement of curing. Samples were taken from the inside of the meat.

	Per Cent.					
Moisture ..	62·51	61·91	61·27	63·74	60·30	63·54
Salt ..	5·92	5·50	5·29	4·98	5·31	5·74
Effective salt concentration ..	9·47	8·88	8·63	7·81	8·80	9·03
	No. of Organisms.					
Count on gelatin per gram of meat	12,000	57,000	113,000	63,000	24,000	−1/10000

The following results were obtained from 3-weeks-old cured bacon similarly treated:

	Per Cent.					
Moisture ..	65·21	63·61	66·30	67·39	66·80	68·97
Salt ..	2·43	3·17	3·22	2·51	3·08	3·15
Effective salt concentration ..	3·72	4·98	4·86	3·73	4·60	4·57
	No. of Organisms.					
Count on gelatin per gram of meat	10,000	32,000	−1/1000	169,000	10,000	9,000

Visual examination showed the meat to be in perfect condition and there was no sign of taint. The bacterial counts fully support this; they are small from a meat-keeping point of view.

In one case of spoilage in a ham it is of interest to note that direct microscopical examination showed the presence of a spore-bearing bacillus in the bone marrow. Numerous bacilli were noted in a portion of meat containing 3 per cent. salt. A fair number were present in a portion of meat containing 4·8 per cent. salt, while in two other portions containing respectively 5·6 and 7·0 per cent. salt, bacilli were not observed.

By the time maturation in the curing cellar is considered complete the salt is fairly evenly distributed and present in sufficient quantity to ensure that the interior of the meat will survive smoking and keep a fair length of time if reasonable cover and storage are provided. In practice, in fact, provided the above conditions are realised, it is found that green bacon sours from outside to inside rather than the reverse.

Rancidity

Normally, rancidity is not a serious problem when meats are smoked, but if in the future, as appears likely, storage of meat intended for smoking does have to be resorted to, then the problem of rancidity will require attention.

W. H. White[5] and his co-workers found that fat from unsmoked samples of bacon was definitely rancid after 39 days' storage at −9·4° C., while that smoked was sound even after 60 days. Rancidity was determined by peroxide oxygen measurements.

Whether rancidity is checked by the presence of anti-oxidants in the smoke or because of the greatly reduced bacterial flora which results after smoking has not yet fully been determined. The results do show, however, that smoking checks and retards rancidity for considerable periods.

Flavour is dependent firstly on the kind of meat smoked. For instance, bacon produced from pork and "macon" produced from mutton have their distinctive flavours, which are altered to some degree by smoking. Beyond this all that one can say is that, provided the processes of curing, drying, and smoking are properly carried out, one may be reasonably sure that the flavour of the resulting product will be satisfactory. There does not appear to be any definite evidence in the literature as to the factor or factors or possible constituents which are responsible for the flavour of smoked bacon.

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The Tennessee Valley Authority floating foods laboratory at Spring City, Tennessee.

Courtesy of Office of War Information, United States Government.

A Floating Food Laboratory

THREE barges operated by the Tennessee Valley Authority house an unusual processing research laboratory for the freezing, preservation, and transportation of foods grown in the Valley. In the course of its work the three-barge laboratory is towed intact from one section to another of the Tennessee River, 650 miles of whose length flows through predominantly agricultural country.

It is one of the small but colourful enterprises of the gigantic T.V.A., whose activity has included a vast programme of soil reclamation and production of cheap electric power for more than 2,500,000 people living in the seven states in which the river basin lies, and whose successful raising of living standards has evoked discussion of other even larger projects elsewhere in the United States.

A wide, scientific T.V.A. programme of fulfilling the productive potentialities of the Valley enlists experimental facilities of various educational institutions in the area. The food-processing laboratories are part of this programme.

In January, 1945, a new freezer locker plant opened by the co-operative at Cleveland, Tennessee, was producing about 7,000 lb. of processed beef and pork every week, then storing it for patrons in the 604 lockers of the "zero" room.

This co-operative negotiates contracts with farmers to grow crops for the T.V.A. floating laboratory's experimental work. From the floating laboratory the farmers of the region also have encouragement in trying both new crops and better methods of harvesting old ones.

The floating laboratory has been undergoing reconditioning and some expansion. On one of its three barges experiments in food preparation and processing by dehydration and other non-freezing methods are to be conducted; on another barge, freezing and cold-storage work is to be done; and on a third, machine-shop work. The machine shop will be used not only for repairs and change-over

Beans undergo a final inspection on their way to the freezing unit in the experimental food processing plant of the Tennessee Valley Authority. The plant is on two barges anchored off Spring City, Tennessee, in the reservoir behind Watts Bar dam.

Courtesy of Office of War Information, United States Government.

On a Tennessee Valley Authority food processing barge, strawberries, frozen hard by a process that keeps each berry firm and separate, are being packed in cartons for merchandising.

Courtesy of Office of War Information, United States Government.

in equipment, but also for designing new apparatus. A recently added feature is an airblast freezer, designed and tested for use particularly in freezer locker plants where the main item for sale is refrigerated space, which is too costly to waste. A modification of the direct immersion equipment freezes foods in moulds of package size by immersing stainless steel cans of the food in the freezing solution.

One of the newer additions to the facilities of the food-processing barges will be a quality-control kitchen. T.V.A. considers it important that the Valley industry set and maintain certain standards in order to build a reputation for reliable quality. Research in quality control will help make this possible.

Tennessee Valley Authority food processing barge.

Courtesy of Office of War Information, United States Government.

The Baker's Dilemma

J. STEWART
National Bakery School.

THE Ministry of Food gave bakers an unpleasant shock by announcing a 10 per cent. reduction in the allocation of oils and fats to trade users. For the cake-maker the new Regulation means either a reduction in the fat content of cake and flour confectionery or the making of fewer cakes. Which policy is the baker to adopt?

By reducing the fat content of the cakes, both output and profits can be maintained, but what about goodwill? By making less cake, thereby maintaining quality, some customers will be disappointed but the majority will be satisfied, and the question is whether it is not better policy to disappoint a few rather than offend many by giving them cakes which stale rapidly and are hardly eatable.

The confectioner's difficulties are increased by lack of supplies of skimmed milk powder, although it is hoped that this will again be available towards the end of the year.

Fat Extenders and Cake Improvers

The confectioner will naturally direct his attention to fat extenders. These have been widely advertised and used, although very few of them improve the quality of cake. The only cake improvers that really do add to their keeping qualities are those containing lecithin, such as dried egg, soya flour, and lecithin extracted from ground nuts. Fortunately, both dried egg and (as far as is known) soya flour are available for this purpose. Those who have supplies of lecithin may use it to extend their fat supplies.

Some confectioners may not realise the practicability of using more dried egg and soya flour, which are better fat extenders than many of the dubious products now marketed as such.

Experiments carried out some time ago proved successful in saving fat in different qualities of cake. The method adopted was to reduce the fat content of cake batters by 25 per cent. and to replace it with 12½ per cent. soya flour and 12½ per cent. dried egg, with the addition of extra water up to the weight of soya flour used. This gave a higher yield from the batters, which offset the increased cost of the extra eggs used and produced cakes with as good if not better appearance, volume, and keeping qualities than those with the usual fat content. All well-balanced recipes with a fat content varying between 10 and 16 per cent. can be altered to save a little fat, and still maintain the quality and food value of the cakes.

The following recipes have been altered to replace 25 per cent. fat with soya flour and dried eggs:

Good Quality Cake

6	lb. margarine
3	lb. compound fat
1½	lb. soya flour
13½	lb. castor sugar
18	lb. reconstituted egg
24	lb. flour
8	oz. baking powder
10½	lb. milk or milk substitute
12	lb. fruit

This recipe should yield about 80 lb. of cake costing approximately 6d. per lb., and of better quality than many bakers are selling to-day at 1s. 6d. per lb.

Cheaper Quality Cake

6	lb. compound fat
14	lb. castor sugar
1	lb. soya flour
4	oz. salt
12	lb. reconstituted egg
28	lb. flour
1	lb. baking powder
17	lb. milk or milk substitute
8	lb. fruit

This recipe should yield about 78 lb. of cake at a cost of 5d. per lb., selling at 1s. 3d. per lb. The cakes produced are of good appearance and remain moist on keeping. If the fruit is left out, the same recipes can be used for Madeira cakes and also for Lunch or Queen Buns, etc.

Lecithin as a Cake Improver

Where a supply of lecithin is available, this can be made into an emulsion using 1 part lecithin to 3 parts water at 140° F. In good quality cakes where the fat content is normally about 16 per cent., 25 per cent. of the fat can be replaced with this emulsion. The batters will generally carry an extra 10 per cent. moisture. The emulsion is not creamed with the fat, but should be dispersed in the milk. In the cheaper types of cakes where the fat content is about 12 per cent., lecithin emulsion can be used to the same extent. The following recipe has been evolved on these lines:

6	lb. margarine
3	lb. compound fat
13½	lb. sugar
12	lb. reconstituted egg
24	lb. flour
8	oz. baking powder
12	lb. milk or milk substitute
3	lb. lecithin emulsion
	egg colour
12	lb. fruit if desired

The yield from this mixing is about 76 lb., selling at 1s. 6d. per lb.

Cheaper Quality Cake with Lecithin

The following recipe uses lecithin as a cake improver and gives an extra yield of cakes:

8 lb. compound fat
14 lb. castor sugar
8 lb. reconstituted egg
28 lb. flour
1 lb. baking powder
20 lb. milk or milk substitute
2 lb. lecithin emulsion
4 oz. salt
egg colour
8 lb. fruit (if desired)

This recipe should yield about 80 lb. of cake, selling from 1s. 3d. per lb.

In all the recipes given above, lemon essence may be used as a flavouring agent.

Beef Production

READING a paper on Beef Production at a recent meeting of the Farmers' Club, Mr. John H. Everall said that it is generally recognised that this country is the Stud Stock Farm of the world, and that it is equally recognised that our commercial cattle stocks are at present of a deplorably low standard. The reasons for this were:

(1) The lukewarm attitude (during the past) of the Ministry of Agriculture to the breeding of high-class cattle and the indifference of the Ministry of Food to the production of high-class beef.

(2) The traditional bias of the average English farmer against pedigree stock.

(3) The high incidence of disease among herds in this country in recent years.

(4) The totally indiscriminate crossing practice which has become so prevalent.

(5) The economic factor.

Analysing these in the order stated, Mr. Everall quoted an example in the first case of the sudden repeal at the outbreak of war of the Licensing of Bulls Act, and, shortly afterwards, the withdrawal of the subsidy for bulls under the Livestock Improvement Scheme. After having enlarged upon this, Mr. Everall mentioned the premium to bad beef cattle awarded by the Ministry of Food, he hoped for the duration of the war only. The standards of killing out percentages have been set low on the grounds that it would have been wasteful, from the point of view of feeding stuffs, to set them higher. As a consequence, big dairy-bred cattle with any amount of bone, killing out at about 54-55 per cent., have been far more profitable than the better quality cattle, in spite of the fact that the latter would easily kill out at over 60 per cent., but which, owing to their smaller weights, have been uneconomical to feed. The Ministry of Food has alleviated the position slightly, but the balance is still well in favour of quantity rather than quality. We can, however, look to a better future, thanks to Mr. Hudson, whose persistent efforts have culminated in a well-conceived licensing scheme that must have very beneficial effects on our cattle-breeding policy.

Discussing the traditional bias of the average English farmer against pedigree stock, Mr. Everall said it was difficult to understand this. He mentioned the warnings of Mr. Hudson's crusaders after visits abroad, that unless we were going to allow ourselves to fall badly behind, we should have to wake up considerably. He did not agree that the blame for all this should be laid at the door of the Breeding Societies, as Mr. Hudson did.

Commenting on the high incidence of disease among herds, Mr. Everall said that it was almost entirely due to the trading through market channels of infected stock. He suggested that a scheme might be introduced similar to that in the U.S.A., by which compensation is paid for diseased animals, and that beef producers might be given the same incentive as milk producers with regard to the Voluntary Vaccination and Attested Herds Scheme (the subsidy for which was withdrawn from beef herds at the outbreak of war).

The totally indiscriminate crossing practice which has been so prevalent was, in the speaker's opinion, one of the principal reasons for the present-day condition of our cattle. It has been brought about by the dual-purpose theory. His view was that the breeding of dual-purpose cattle is a dangerous practice which should only be indulged in by experts, although he did not mean to suggest the elimination of dual-purpose breeds themselves, but that they should largely convert this into a single-purpose breed either for beef or for milk. For instance, one of our generally recognised dual-purpose breeds was now stated to be the third highest milking breed—why not go the whole way, forget entirely about beef, and try and beat the other two for first place for milk? The great beef-producing countries of the world concentrate entirely on either beef or milk.

Discussing the future, the speaker said that to breed really good beef was to breed from beef cattle. During the last fifty years it had paid much more handsomely to produce milk than beef. A good average dairy cow to-day produces 700 gallons of milk, leaving a gross income of say £70. A good beef cow produces a good steer of live weight (say) 8 cwt., at twelve months old which, at to-day's prices, would leave a gross income of approximately £30. Deducting an estimated figure to cover the extra cost of feeding and milking the dairy cow over and above the cost of feeding and labour on the beef cow and her steer calf, we have the result that the dairy cow is just 100 per cent. more profitable than the beef cow. Mr. Everall asked what was the answer to the question—where could we get good beef? He thought either from Eire, as in the past, or from our dual-purpose cows. He personally would prefer to feed beef himself from the former. They must always be superior to our own dual-purpose breed store cattle—derived from low-yielding type dairy cows and sired by colour-marking beef bulls, and it is doubtful whether these particular dairy cows would always be available. His view was that the excellent policy of our Ministry as at present laid down would, in time, dispense entirely with this class of cow kept at present for rearing these calves.

Macaroni Manufacture

MACARONI manufacture in this country is a comparatively recent growth and before the war there were only a few firms which turned out this article. One of these, James Marshall (Glasgow), Ltd., began to manufacture in 1935. They were the first concern in Scotland to produce macaroni on a commercial scale. From Italy they brought in the best plant then available, and drew upon the long experience of macaroni makers on the Continent and elsewhere.

Generally stated. macaroni is a dried dough. It is made by mixing semolina and hot water. The dough is pressed into the required shape while plastic and then dried. Over a long period of time much has been learned about this apparently simple process. The variance of colour, texture, and hardness of the final product decides whether it is good macaroni or not. The production of a quality article depends on attention to all the niceties of temperature control, air adjustment, and other details of manufacture. In discussing these methods here it will be understood that short cut macaroni, the usual type to-day, is referred to.

So far in this country no system of standardisation of macaroni has yet been established. Opinion may vary, but high-class macaroni is generally accepted as being cream to amber coloured, slightly translucent, slightly rough in texture, hard and with no cracks in it. It should break with a clean fracture, leaving a flinty edge. The small curved tubes of the short cut variety should have retained their tubular shape through the process of manufacture. Each piece should be cleanly sheared at the ends with no ragged edges.

Raw Material

The raw material used for macaroni is wheat semolina—the hard glutinous part of the wheat grain. It is first freed from bran. Common practice has been to use the semolinas of Durum wheat —particularly amber Durum, because it gives the desired colour to the finished product. It has been found, however, that by using a proportion of semolina from Manitoban Spring wheat along with the Durum a better product has been obtained than from the Durum alone. The advantage of this mixture is most clearly seen in the manufacture of long macaroni. Manitoban semolina in the mixture simplifies the tricky process of drying. It makes the macaroni tougher, less brittle, and with less tendency to crack. There is more elasticity in the dried product and the toughness helps the macaroni to retain its shape when cooked.

The Manitoban semolina is paler in colour than the Durum, and so the first process of manufacture is to see that the two are thoroughly mixed.

Mixing, Cleaning and Weighing

In this particular type of manufacture the daily output depends on the number of times the hydraulic ram can empty the cylinder of dough on which it works. This circumstance determines the system of production, which is by batches, as distinct from a continuous process. Each batch is a unit, automatically weighed off from the blended semolina. The process of mixing is carried out in a flat-bottomed trough with a wooden spade. The

Steam-heated hydraulic press for macaroni and spaghetti manufacture.

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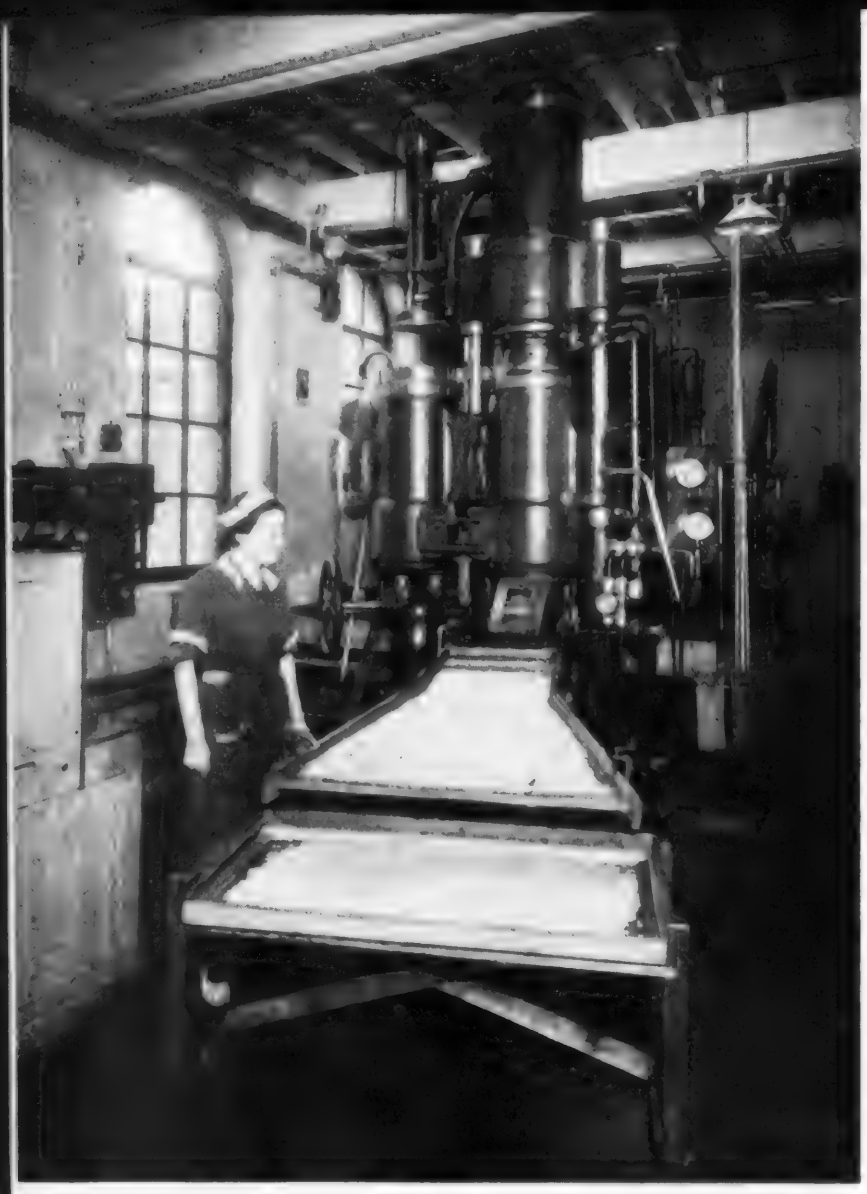

Steam-heated hydraulic press in action.

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mixture is drawn away from this by gravity and passed through an oscillating sieve which separates out from it impurities such as sack hairs, etc. These pass over the tail of the sieve. The purified mixture stores up in the hopper, which feeds an automatic weighing machine. This machine is controlled by an attendant who, at will, discharges the weighed quantity from it into the vessel where hot water is added to the semolina.

Doughing and Kneading

Preparatory to kneading, a quantity of hot water is well stirred into the mixture. This produces a dry crumby dough after ten minutes' working by the paddle arms in the vessel. The water temperature is kept at 100° to 140° F., and the proportion of water to mixture is 3½ gallons to 120 lb. The vessel is supported on trunnions and arranged so that it will discharge by tilting. In this way it passes on the crumby mixture to the Kneading Machine.

The chief feature of this machine is a revolving pan, which carries the dough round in a continuous strip against its containing wall. As it revolves the dough is subjected to kneading action under fluted rollers. The intensity of kneading is adjustable. Ten minutes of this process changes the crumby mixture into smooth dough, which is moist and buttery to the touch.

The packing of dried macaroni.
By permission of the Dux Engraving Co., Ltd.

The Hydraulic Press

The heaviest work is done by the hydraulic press, giving the macaroni its characteristic appearance. Two cylinders on a vertical axis, side by side, are supported on a steel column through the bracket which joins them. Above one is the head of a hydraulic ram which operates at 2,000 lb. per sq. inch. Above the other is a lighter hydraulic ram working at a lower pressure. Two cylinders are made so that they swing on the steel column, turn about, below each of the ram heads. The advantage of this is that while dough is being extruded from the cylinder below the high-pressure ram, the other cylinder can be filled and packed with the next batch of dough under the low-pressure ram. When the operation in both cases is completed the cylinders are swung on their centre steel column through 180° and the process repeated. A die lies at the bottom of each cylinder. The dough is pressed through the one below the high-pressure ram head. Under this die is a cutting knife which revolves against the lower face of the die.

Each cylinder has a steam jacket, the purpose of which is to keep the cylinders constantly at the same temperature as the dough. It has been found advisable also to warm the die before the first batch comes through, or else the macaroni will be rough skinned.

Following the dough from the kneading machine then, the first process is to fill the empty cylinder under the packing ram. This takes the complete batch from the kneader and the packing ram presses it tightly into the cylinder.

The cylinder is then swung under the high-pressure ram. As the dough appears through the die the revolving knife cuts it off into short lengths. It is possible to regulate the length of the piece minutely by altering the speed of the cutting knife or the pressure behind the ram, both of which are adjustable. Immediately it emerges from the die the soft macaroni, as the dough may now be described, is subjected to a blast of air at 70° F., which has a case-hardening effect on it. This prevents the small tubes from collapsing as they are spread on a tray for drying.

Drying

The most difficult part of the whole process of macaroni manufacture is drying. One might almost use the word "tempering."

To illustrate what is meant: if a piece of macaroni were allowed to lie on the floor and dry casually, as it were, by floor draughts, it would shiver into small pieces when picked up.

The Continental method of drying is to subject the newly formed macaroni, which has received its preliminary case-hardening blast of air, to a further period in a pre-drier. Here the trays of macaroni are piled one on top of the other and a strong draught of air of room temperature, 70° F., is drawn through them. This process lasts for

(*Continued on page* 256)

The Pasteurisation of Milk

THE CONTROVERSY over pasteurisation of milk seems destined to last as long as that over free trade or the consecration of Matthew Parker.

Whatever views one may hold about the subject, it must be admitted that the latest contribution to the subject* will at least stimulate interest and add fresh fuel to the seemingly eternal fire. It might be thought that a problem which is so essentially scientific in nature could be decided by specialists in the laboratory, and that it is undesirable that the failure of the technicians to agree should be publicised outside scientific circles.

When Doctors Disagree

When specialists disagree the shrewd man in the street usually concludes that the balance is fifty-fifty anyway, with the result that he is unlikely to support any attempt officially to impose regulations on the community. A further point is that public argument and disagreement over technical matters must inevitably lower the prestige of the participants in particular and scientists in general. The layman will argue that either one of them must be wrong, or that the truth lies between them and each is presenting only one-half of a panoramic landscape. However, we are fortunate in living in a country where any man can say what he believes to be the truth. Was it Voltaire who said that although he might disagree most violently with what we said, he would fight to the death for our right to say it? It will be a sad day for this country if the malignant growth of bureaucratic control should ever stifle the healthy tissue of public criticism—a danger which is not so remote if we pursue the policy of making our scientists and medical researchers into State servants, bearing not only the official yoke, but also the official muzzle.

The important thing, then, is freedom for experiment and freedom for the publication of results and the voicing of opinions, for truth will emerge triumphant in the end. Nor should we make the mistake of assuming that all controversies can be settled by straightforward experiments. A dispute over the exact time and temperature conditions required to kill T.B. can be settled in the laboratory by competent experimentalists familiar with the difficulties—*e.g.*, realising that the survival of naturally occurring T.B. may be greater than that of artificially added organisms. But when we come to the whole question of compulsory pasteurisation we face a problem which extends its tentacles into a vast number of interests—public health, the future of the producer-retailer and the small dairyman, the keeping quality of milk in the home, and the highly specialised fields of the immunologist and the nutritologist.

Mr. Bibby describes his book as "a statistical examination of the claim that pasteurisation of milk saves lives," and fifty-nine pages are devoted to a detailed discussion of vital statistics in relation to T.B. and in particular to a criticism of Professor G. S. Wilson's book, *The Pasteurisation of Milk*.† It is unlikely that Mr. Bibby's contentions will be accepted in informed scientific and medical circles, as his discussion of the subject consists largely of categorical statements for which there is no real evidence (as, for example, in the foreword) and the careful selection and highly original treatment of statistical data. A critical and detailed review of all these points would constitute a book in itself, but a few examples will suffice to illustrate this.

Although statisticians do not always agree, there are certain rules which are generally obeyed. Thus a sufficient number of deaths to make the reasoning sound is a *sine qua non*.

Standardisation of Death Rates

Further, it is important to standardise death-rates and to distinguish between deaths and death-rates. Professor Wilson has worked with large populations and standardised death-rates, whereas Mr. Bibby gives us more variety in treatment. He quotes Wilson's table (Table III in Bibby) apparently without realising that these death-rates are standardised. Further, his Tables V and VI are constructed on deaths, not death-rates, and so the all-ages proportion does not allow for the change in the age constitution of the population during 1931-37. The small number of deaths due to pulmonary tuberculosis under 15 makes the results very susceptible to chance annual fluctuations. In his criticism of Wilson for ignoring the 0 to 15 age group he overlooks the treatment of the fall in non-pulmonary tuberculosis on page 154 of Wilson's book. In Table VII he has not considered changes in age constitution of the population, and for some of the areas considered—*e.g.*, rural Lancashire—the total number of non-pulmonary deaths is so small that any conclusions are unreliable, and to calculate death-rates to the first place of decimals is unnecessarily accurate when the total number of deaths involved is between 20 and 30. On the analysis of the abdominal tuberculosis figures (Tables VII, VIII, and IX) Mr. Bibby has considered all ages, thus including many cases of human type infections. Wilson considered only cases for children under 5.

* *The Case against Pasteurisation*, by John P. Bibby. London. Pp. 71. 1s.

† Reviewed in FOOD MANUFACTURE, November, 1942, page 325.

The criticism of the Toronto work (Bibby, p. 36; Wilson, p. 156) will hardly convince the immunologist. The phrase "genetic resistance" sounds very fine, but the evidence for its existence is highly controversial. It is probably true to say that *individual* resistance to tuberculosis, inborn or acquired, is of considerable significance. All workers in this field will accept the fact that this problem is a very complicated one, requiring the utmost care in investigation and analysis of the figures. So many factors come into play—occupation, environment, age, natural resistance, method of infection, size and virulence of dose, nutrition, etc.—that it is very difficult to eliminate or control all factors except one. For example, children domiciled in "pasteurised areas" may, on visits outside the area, drink tuberculous milk. The statistical treatments are indeed fraught with difficulties.

Immunisation

The ever-recurring idea of the immunising effect of tuberculous milk dies hard, but what would the average mother reply if the family doctor were to say: "Madam, I have come to immunise your child against tuberculosis. I have a hundred doses in my bag here. About sixty of them will have no effect, thirty-five may possibly have some effect, four will probably result in some form of disablement, and one will undoubtedly kill the patient. Unfortunately, I don't know which is which"? There would be no doubt of the mother's reply. Nature's way or not, she would expect something a little more certain for her money.

Even if nature's way does breed a race slightly more resistant to disease, are we to revert to this method and abandon the advances of modern preventive medicine and sanitation? Are we to abandon modern hygiene and expose ourselves to the risk of infection from diphtheria, typhoid, smallpox, and venereal disease, to sacrifice a considerable proportion of our population in order that a lucky minority may develop a certain amount of immunity to these diseases?

In conclusion, attention may be drawn to an illuminating statement in Mr. Bibby's book. It is on page 38 and runs as follows:

> The observation in the Toronto Hospital proves one thing only—that people who do not expose themselves to bovine infection do not contract bovine tuberculosis.

I am afraid that those of us who are working for a safe milk supply will continue to do so.

The chapter on the effect of pasteurisation upon the nutritive value of milk needs little comment. Mr. Bibby has completely ignored all work since 1931 and concentrated upon work in 1924. It is generally accepted in scientific circles that the most accurate work has been done since then.

J. G. DAVIS.

FOOD ABSTRACTS

CANNING

Freezing of Canned Foods

If the contents of cans freeze solid, as may happen in severe conditions, the foods suffer little or no damage, report Smith and Smith (*Food Res.*, 1944, **9**, p. 66), and provided they are allowed to thaw gradually they can be prepared for the table in the normal way. Only with a few vegetable products and some starchy compounded rations were changes in texture detected, and these were not sufficiently serious to affect the acceptability of the product. The cans themselves were not damaged by freezing.

Vitamin C in Stored Canned Citrus Juices

Immediately after processing and canning the ascorbic acid content of orange and grapefruit juices was 92 to 98 per cent. of that of the freshly expressed juice, in studies made by Ross (*Food Res.*, 1944, **9**, p. 28); after a year's storage at room temperature the retention was still 70 to 80 per cent. of the fresh value, while under refrigeration it was 90 per cent., indicating virtually no loss.

In general, retention of flavour and vitamin C content ran parallel.

It is further shown that when the cans were opened the contents could be kept for two or three days in a refrigerator, or for shorter periods at room temperature, without deterioration.

DEHYDRATION

Dried Pineapple

Several recent developments have shown that the dried fruit trade has been needlessly conservative in offering the conventional and restricted range of commercial dried fruits. Many tropical and sub-tropical fruits are suitable for drying. Dried guavas have been produced in South Africa and dried mangoes and Cape gooseberries in Southern Rhodesia. Now Friar and Holton (*Fruit Prod. J.*, 1944, **24**, p. 70) in California have demonstrated that it is possible to prepare an excellent grade of dried pineapple. It is said to make a good confection when syruped.

Dehydrated Pork-Cereal Mixtures

An obstacle to the successful dehydration of pork is its high fat content. Not only has a large amount of discrete fat to be removed before dehydration, but rancidity may soon develop on storage. Carl, Watts and Morgan (*Food Res.*, 1944, **9**, p. 319) have now found that if chopped pork is mixed with maize meal in the following proportions before cooking and dehydrating a product is obtained which does not readily become rancid, and which is more palatable than "straight" dehydrated pork meat:

Ground lean pork (20 per cent. fat, or less)	100 lb.
Water	5¾ gal.
Maize meal	14¾ lb.
Salt and pepper to taste.	

After dehydration the products contains 4 per cent.

water, 37 per cent. protein and 28 per cent. fat. It could be compressed satisfactorily, and then has a calorific value of about 5 Calories per c.c. It is palatable without rehydration.

Mixtures of beef and lamb and other cereals also gave satisfactory dehydrated products; with fish the results were not so good.

Vitamin Loss during Meat Dehydration

Determinations carried out by Swift and Company's Chicago Laboratories (*Food Res.*, 1944, **9**, p. 92) show that, on the whole, losses of vitamins during dehydration are no greater than those occurring during domestic cooking and, especially for vitamin B_1, are much less than during canning.

It was found that dehydrated beef retained 76 per cent. of the vitamin B_1, 105 per cent. of the riboflavin, 92 per cent. of the nicotinic acid and 68 per cent. of the pantothenic acid of the raw meat. Retentions of vitamins in the same order for pork were 63 per cent., 104 per cent., 92 per cent., and 73 per cent.

When stored at temperatures above 80° F. dehydrated pork lost much of its vitamin B_1, but very little of other B vitamins.

Dehydrated Fish

Methods of fish dehydration employed on the Pacific coast of America are described by Hamm, Butler and Heerdt (*Food Ind.*, 1944, **16**, p. 445).

Prime fillets are cooked for seven to ten minutes at 5-10 lb. steam pressure, minced and dried in a tunnel drier. Finishing temperature should not exceed 145° F. Storage life is increased by a low final moisture content. Data for many species of fish are catalogued.

Storage Life of Dried Vegetables

Continuing the series of papers from the Low Temperature Research Station, Cambridge, on dried vegetables, Tomkins *et al.* (*J. Soc. Chem. Ind.*, 1944, **63**, p. 231) have presented data on the storage life which can be expected for dried vegetables produced by modern English methods.

Factors in determining storage life are adequacy of scalding (blanching), and the maintenance of a low moisture content, which should not exceed 7 per cent. for potato, 5 per cent. for carrot, and 5 per cent. for cabbage.

The brown discoloration which develops at tropical temperatures may be counteracted by drying to an even lower moisture content.

Containers must be moisture-proof, and in present conditions metal containers are advisable. By replacing the air in the container by nitrogen the culinary quality and nutritive value of dried carrot and the nutritive value (ascorbic acid content) of cabbage and potato are preserved.

Storage life of good-quality English dried vegetables is estimated as follows (in months):

	Stored in Air.			Stored in Nitrogen.		
	37° C.	28° C.	15° C.	37° C.	28° C.	15° C.
Cabbage	3	9	15	3	12	24 or more
Carrot	3	4	5	3	12	24 ,, ,,
Potato	3	10	15	3	12	24 ,, ,,

New Methods of Producing Mashed Potatoes

Chief problem in producing mashed potato powder is to avoid damage to the cell walls, since if these are broken gelatinised starch is released, which forms a sticky paste when water is added. Two methods of preparing mashed potato powder of good quality, developed at the Low Temperature Research Station, Cambridge, have been described by Barker and Burton (*J. Soc. Chem. Ind.*, 1944, **63**, 169, 213).

In the brush sieve process cooked mashed potato is partially dried on a roller drier and is cooled and set aside for some hours, which causes it to become friable, so that it can be reduced to a powder on a brush sieve; it is finally dried to 4 to 8 per cent. moisture content.

In the spray-drying process, which is carried out in one stage, the cooked mash is diluted with water, sieved to remove lumps and fed to a spray-drier of the jet-feed or centrifugal atomiser type.

A third process is being used in this country to produce mashed potato powder for the Services, but details have not yet been disclosed.

Enzymes for Hydrolysing Starches

Basic information on the use of enzymes from sources other than barley malt for the hydrolysis of starches has been made available by recent work of Dr. W. W. Pigman at the U.S. National Bureau of Standards. At the request of the Wheat-Alcohol Committee of the War Production Board, Dr. Pigman undertook a study of various types of enzyme preparations that might be used to convert starches into substances fermentable by yeasts.

It has been found that enzymes prepared from certain moulds are able to break down starches completely to fermentable sugars in the presence of yeasts. On the other hand, enzyme preparations made from some bacteria and from pancreases do not break down starches completely to fermentable sugars, even if yeasts are present. The enzymes found particularly in wheat and soya beans also do not bring about complete saccharification. For certain of these enzyme types, complete hydrolysis to fermentable sugars probably does not take place because certain unfermentable materials are formed from the products of hydrolysis. The synthesis of such substances by the action of the enzyme preparations on maltose, for instance, has been demonstrated. Tre nature of the actions of the various types of enzymes that hydrolyse starch has been considered in relation to the structures of the various starch substances, and procedure for liquefying starch suspensions without the intermediate formation of gels has been developed.—*Chemical and Metallurgical Engineering.*

Aluminium and the Food Industry

M. SCHOFIELD, M.A., B.Sc., F.R.I.C.

Battery of four aluminium juice-storing tanks, each fitted with steam coil and portable agitator.

Courtesy of Robert Kellie and Sons, Ltd.

RECENT announcements in the trade Press show much concern over the possibilities of utilising the high output from the aluminium industry, so greatly expanded, when the changeover to post-war period takes place. Already it is stated that Canada's output is being reduced to less than 40 per cent. of the 1943 figure because of reduction of orders from the United Kingdom and also because of discontinuance of those from the United States. A Montreal correspondent of *The Times Trade and Engineering* states that, despite this reduction, the completion of the early 1945 programme will still leave in the Canadian industry almost three times the number of workers engaged in pre-war years. The Aluminium Company of Canada hope to enlarge the application of aluminium by putting increased research staffs on to this problem. With the cessation of hostilities Norway will look to the re-establishment of her aluminium industry which Germany sought to destroy (or such of it left by Allied bombing). That great combine the Norsk Hydro had started, under I.G. control, the production of aluminium from Norwegian "labrador" instead of from bauxite. But the scheme failed; the Heroeya plant was destroyed by bombing; and the factories in Glomfjord and Eitrheim, intended to be the world's greatest, have been demolished. The Nordag has been forced to stop work on four new plants, yet post-war years will see Norway take a prominent part in the world's aluminium market.

So we shall see an aluminium problem, as was the case when aluminium interests offered prizes in open competition to stimulate research and find new cases for the metal. One direction in which post-war consumption might be greatly increased is in the food industries and in replacing domestic cooking utensils in short supply at present. Both these outlets may raise again the "aluminium scare" which still surives in published work, both in research publications and in books like *Aluminium, A Menace to Health*, by M. Clement, and others with such titles as *Death in the Pot*. On the one hand, there exists such literature as *Aluminium Poisoning* (C. T. Betts, Ohio—the Anti-Cancer Club of America), *Dare We Use Aluminium Cooking Utensils?*, also by this author; or *The Danger of Food Contamination by Aluminium*, by R. M. L. Hunte; or the published work of the Russian A. L. Tchijevsky of Moscow. On the other there is the work of K. Mackenzie, J. H. Burn, Lunde, Aschehoug and Kringstad, in which the aluminium scare is banished.

From an impartial point of view the work of the latter body seems more convincing, especially since examination of some of the statements of those condemning the use of the metal suggests a lack of scientific background. For example, in the work by M. Clements, which seeks to prove that aluminium is a "slow-acting poisonous metal" leading not only to lesser disorders but to "major organic diseases," one comes across the warning issued by the British Aluminium Hollow Ware Manufacturers that aluminium should not be cleaned with alkalis or alkaline salt solutions, since solution takes place. Yet this is no argument against the use of the metal, since the cleansing solution is not used in cooking food. The author refers to the solubility of aluminium in the hydrochloric acid of the stomach secretions; but this again is hardly

to the point, since any aluminium arriving in that region will already be dissolved in any case. Further references to aluminium being "thrown into solution" and to impurities occurring in aluminium like fluorine, copper and zinc, ignore the fact that the exceedingly minute amounts present (if any at all) often constitute essential trace elements in the diet. To take a final example, the idea of free aluminium robbing the body of free sulphur is a strange statement considering the complete hydrolysis of aluminium sulphide ($Al_2S_3 + 6H_2O = 2Al(OH)_3 + 3H_2S$), just as is the suggestion that aluminium acts on "potash, sulphur, chlorine, silica" and causes a deficiency of these (the answer to the chlorine problem is obviously to take it literally with a pinch of salt!).

In contrast to such supporters of the idea that aluminium utensils and food preparation plant are harmful are a number of research papers and reviews giving the opposite view. Thus, K. Mackenzie (*Biochem. J.*, 1932, **26,** p. 833) concludes that aluminium inclusions in the diet have no perceptible influence (*a*) when the diet is adequate for growth and reproduction in the rat, (*b*) when the diet is insufficient for growth or maintenance, and (*c*) when fed to several successive generations of rats. It is claimed that aluminium absorption from such diets is exceedingly small. J. H. Burn in *The Analyst* for the same year (**57,** pp. 428-440) gives a complete review of the "Physiological Action of Aluminium," this being particularly interesting since it includes experiments on the diet of human beings, thus answering the charge of those who hold that experimental animals are no guide to effects on man.

American Investigation

It was the agitation against alum in baking powders in the United States in 1911-14 which led to a formal investigation by the Department of Agriculture in that country. University students in different areas were given daily amounts of aluminium throughout a period of six months, daily records of body weights, etc., being noted. In the quantities up to 75 mg. per day aluminium proved harmless, up to 200 mg. per day may cause mild catharsis, and in the exceptional amounts of 1 g. per day catharsis may prove more pronounced. The Mellon Institute of Industrial Research published in the Bibliographical Series a bulletin (No. 3, 1933) in which further review of the whole question favoured the view that aluminium was harmless in such quantities as are absorbed from vessels by normal foods. It is pointed out here that those cases of "poisoning" claimed by the champions of aluminium poisoning were in many cases not concerned with fruit acids which do tend towards solution of aluminium, but with protein foods which could quite easily have been unsound from other causes. Of especial interest to food technologists are results from studies of aluminium absorption by foodstuffs during cooking or canning. Thus, J. H. Burn (*loc. cit.*) quotes the work of Massatch from *V. A. W. Hauszeitschrift*, June, 1929, in which by ash analysis the quantity of Al_2O_3 absorbed in culinary experiments is determined. Scrambled eggs and bacon cooked in an aluminium pan contained 0·06 mg. of the oxide, cocoa 0·6 mg., cabbage cooked in vinegar 5·5 mg., and apple sauce 6·0 mg.

Canned Foods

Yet more interesting, in view of the Norwegian large-scale work on canning using aluminium, is the 1937 paper of Lunde, Aschehoug and Kringstad (*J.S.C.I.*, 1937, **56,** pp. 334-339T) on "Feeding Experiments with Canned Food Packed in Aluminium Containers." These authors, as the title indicates, go further than studying additions of aluminium to the diet of experimental animals by simulating practical conditions. They point out that the quantities absorbed, except in special cases (viz., when free acids are present in packed foods), are no greater than the minute amounts of aluminium normally present as trace elements in foods. In the case of sild sardines in oil, a two-months' packing in aluminium cans caused 4·9 to 5·2 mg. per kg. to be absorbed, nine months' causing up to 25 mg., and twenty-three months' packing up to 104 mg. With brisling sardines in oil, twenty months in the can caused 35 mg. aluminium to be absorbed, while with thirty-eight months' canning the maximum absorbed was 85·9 m., this smaller proportion compared with sild sardines indicating the variation with small difference in foodstuff packed. Unsmoked herring in oil absorbed up to 74 mg. in twenty-five months, while other products commonly packed in pre-war Norway, such as fresh herring, kippers, crab, and fish balls, yielded similar results. Such figures, as the authors point out, are not substantially greater than the aluminium absorbed in preparing foods in aluminium utensils in the household. The authors banish the idea of cancer resulting from aluminium in the diet; point out that guinea-pigs, rats, dogs and human beings have all been studied in feeding tests; and proceed to give feeding tests using food in which the aluminium traces are actually derived from canned goods. Thus one group of mice was fed on Norwegian brisling and sild in olive oil which had been in the aluminium containers for four years and had the full 100 mg. per kg. fish. Along with some milk and bread 0·7 g. of fish was fed per day, while a second group had fresh tinned food, a third group no tinned food. No difference in growth was observed. Metabolism tests on rats followed, with 5 g. sardines (from aluminium cans) fed per day. It was found that the aluminium was excreted quantitatively each day, no injurious effect or abnormal weight being

evident. Breeding tests showed no essential difference between rats fed on food from aluminium cans and control groups, the growth being just as good in the last generation, and no retention of the metal in the kidney or liver being found.

Aluminium Cans

From such laboratory tests one passes more convinced to practical examples of progress made in aluminium canning. An example of Norway's pioneer work in this direction is given in *Metallurgia*, 1938, **17**, p. 159. As Norway had to import all tinplate she naturally turned to her aluminium, estimating that the amount which would be consumed annually if fish-canning became common throughout the country to be 6,000 tons. The A/S Norsk Aluminium Company, now part of the Norsk Hydro combine, became pioneers in sponsoring the project, research laboratories of the canning industries taking up the study at the request of this company. Lunde in a 1932 paper had shown that there resulted no inside blackening of cans with sardines and kippered herring, nor was there any taste or smell or contamination with such fish which tended to corrode tinplate over long periods. Unprotected aluminium can be used, the cans are of extremely light weight (one $3\frac{3}{4}$ oz. can weighs less than 1 oz. when empty), while easy opening contrasts with the Portuguese cans these war years have brought. During the period 1932-35 the number of aluminium cans used increased to 3 million. Fruit conserves, fish in tomato (but not unsterilised conserves or unsweetened milk owing to hydrogen formation with unprotected aluminium), crabs, shrimps, fish in gelatine, and meats for army supplies were all packed in the new containers. In 1936 the number of aluminium cans used had increased to 15 million, with 350 tons of metal consumed. Aluminium containers were strengthened by corrugations on sides, base and lids, this giving an attractive appearance. Sterilisation was carried out in super-pressure retorts to avoid straining the seams and giving the can a swollen appearance.

Wider Uses for Aluminium

Other countries up to the war years found wider uses for aluminium in domestic ware, food packing, and food processing, although they had not progressed in canning like Norway had done. This country saw a popular increase in aluminium cooking utensils, the bulk of which were pressed from sheet at first, although more were produced of the sand and die-cast type as the demand increased. As an alternative to the use of pure metal, die-cast alloys including up to 5 per cent. silicon and up to 3 per cent. copper appeared, while another alternative included 1 per cent. manganese for imparting greater stiffness to the utensils. Aluminium foil, embossed and dyed on one side, displaced tin for chocolate wrapping, while Alfol heat insulation for large meat and milk transport vehicles represented yet another outlet. The United States in 1938 produced 2 million jar and bottle closures of aluminium and built 200,000 beer barrels of this metal. In both countries the butchering and pork-butchering trades adopted aluminium trays and vats for meat transportation and for collecting wastes from abattoirs and shops. The margarine industry used aluminium, which is unattacked by fatty acids, for the construction of kneading machines, cooling and dropping vats, and trolleys, since this metal, unlike copper, has no appreciable effect on vitamin content. Breweries, dairies, and cheese-making concerns have also adopted the metal in many instances, sterilising, fermenting and storage vats being examples of plant in use. Such examples point the way to one large outlet for aluminium in post-war years when decline in aeroplane production will bring new impetus to the search for new consumers of the metal.

The Preparation of Marinated Herring

THE term "marinated" is applied to fish which have been cured for a certain length of time in salt or is a salt-spice mixture and then covered with spiced vinegar to which a small amount of sugar has been added. Herring is the species usually used for marinating, but smelts and anchovies can also be prepared in this way.

Since the fish is not cooked during the processing and palatability limits the concentration of the salt, vinegar, and sugar employed as the only preservative agents, the product keeps for only a limited time. If stored in a cool place keeping time may be as long as 3 months.

Where fish is available at all times in suitable quantities the salt curing and final bottling in vinegar may be done in the one plant, but the usual practice is to purchase Scotch-cured or dry-salted herring in bulk and leach the fish as required. In order to discover the best method of handling the salted herring a number of experiments were conducted at the Pacific Fisheries Experimental Station. Since it was thought that the purity of the salt used in dry salting might be a factor in the toughening of the final product the first experiment involved the comparison of marinated herring produced from fish which had been heavily salted with coarse "hide" salt with that produced from fish salted with mild-cure salt and later repacked in clean 90° salometer brine. The two methods of treatment were as follows:

Experiment A. Hide Salt

Fresh round herring were rinsed lightly and salted with an excess of hide salt in a watertight container. They were allowed to remain in the salt for 25 days. At the end of this period the herring were filleted and divided into three lots. These three lots were leached

in fresh water for 3, 4, and 6 hours respectively. The fish were then transferred to a vinegar solution consisting of 2 parts of commercial white vinegar to 1 part of water, where they remained for 24 hours. Finally they were packed in jars with a few slices of raw onion and a small amount of dry " mixed " spices and covered with spiced vinegar, which, for all these experiments, was prepared according to the following recipe :

Vinegar	4 pints
Water	2 ,,
Sugar	2 oz.
Cloves	¼ ,,
Mustard seed	¼ ,,
Whole black pepper	¼ ,,
Cardamon seeds (cracked) ..	½ ,,
Whole ginger (cracked) ..	½ ,,
Bay leaves	½ ,,

The spices (tied in a bag) were allowed to simmer in the solution of sugar and vinegar for 1 hour. The solution was then filtered and was ready for use.

Experiment B. Mild-Cure Salt

Fresh round herring rinsed lightly in water were soused in mild-cure salt (a refined grade of salt used in the production of mild-cured salmon) and packed in a watertight container. After 10 days the herring were repacked, the brine produced by the extraction of water from the fish was discarded and clean 90° salometer brine substituted. After repacking, the fish remained a further 15 days in the brine and were then filleted and divided into three lots. These three lots were leached in fresh water for 2, 3, and 4 hours respectively, and this was followed by a period of 24 hours in vinegar solution (2 parts vinegar to 1 part water). Finally they were bottled with raw onions, spices, and spiced vinegar. They were stored at room temperature for a week and then examined. The practice of storing the samples at room temperature was followed throughout all these experiments, so that any breakdown would be accelerated. At low temperatures the breakdown or enzymatic digestion of the fish proceeds at a much slower rate. On examining the stored samples no difference in flavour or texture could be detected between the hide salted (dry salted) fish leached for 3 hours and the mild-cure salted (Scotch-cure) fish leached for 2 hours.

The mild-cure salted fish which had been leached for 3 and 4 hours was very soft and broke up when attempts were made to lift it out of the jars. The dry-salted fish soaked for 4 and 6 hours were also soft and mushy.

Considerable darkening of the fish in the vicinity of the backbone of both lots was observed, and since the herring used were summer herring and oily some signs of rancidity were present.

Experiment C. Other Variations

In the next experiment a number of different treatments using only mild-cure salt were tried, since such salting seemed preferable. The herring were either gibbed or dressed before the initial salting. This gave the fillets a better colour but did not detract from the " cured " flavour produced by the action of the enzymes on the proteins and fats which is characteristic of this product.

Since the labour involved in dressing the herring is no more than that in gibbing, and since the head, bones and viscera must eventually be discarded, it would appear that the dressing operation is better than merely gibbing. In Scotch-curing herring the fish are gibbed before being salted.

After salting, various leaching periods were used ranging from ½ hour to 3 hours; both in conjunction with, and omitting, the period of " pre-curing " in vinegar solution. Results obtained in the experiments here reported do not show any necessity for this pre-curing, an equally good product being obtained when it was omitted.

Toughness or mushiness of the final product depends on the salt content of the fillets when they are packed in the vinegar, and can be controlled directly by the period of leaching.

For mild-cured or Scotch-cured herring a leaching period of 1½ to 2 hours in cold fresh water was found to remove sufficient salt to produce a satisfactory flavour in the final product. Further pre-curing in vinegar solution does not appear to have any value. The fillets may be transferred directly to the bottles and the condiments and spiced vinegar added. After a period of about 6 days, during which the jars should be stored in a cool room, the product is ready for consumption.—*Abstracted from a paper by E. P. Sidaway, Pacific Fisheries Experimental Station, Vancouver, B.C.*

COTTON-SEED AS SOURCE OF LECITHIN

Soya bean phospholipid, commercial source of lecithin, an antioxidant and emulsifying agent widely used in foods and pharmaceuticals, finds a close counterpart in cotton-seed phospholipid, according to recent investigations. The cotton-seed phospholipid was prepared experimentally by stirring commercial cotton-seed, containing phospholipid, with changes of acetone to precipitate the phospholipids. The resulting powdered phospholipids were dissolved in ethyl ether and then poured into an excess of acetone. The resulting purified phospholipid was a stable, powdery solid, brilliant yellow in colour, and the yield was 54 per cent. 15 to 20 per cent. of this phospholipid could be dissolved by extracting with multiple changes of hot ethanol. This resulting lecithin fraction was high enough in phosphorus and nitrogen to render it commercially usable. —*U.S.I. Chemical News,* November, 1944.

ERRATUM

City Analyst's Report

In the May issue of Food Manufacture, page 168, an omission occurred in the fifth line of the first paragraph. What is referred to is the pasteurised milks as tested by the Phosphatase Test only in that particular part of the report.

The statement that " the percentage of all milk samples reported as satisfactory reached the record figure of 98·3 per cent." on casual reading might give the impression that it was the chemical composition of milk samples that was being referred to. The word " chlorination " in column two last line but four, should read " chloramination."

Rapid Routine Refractometry

C. F. M. FRYD, B.Sc., A.R.C.S., A.R.I.C.
Department of The Government Chemist.

SOME recent work in one of the laboratories of the Department of the Government Chemist necessitated the determination of refractive indices at the rate of many hundreds a week for a year or more. At the same time it was considered desirable that the reading of the instrument should be independently checked on each occasion. Certain modifications to the instrument, designed to save time and to prevent damage by excessive handling, have been very briefly described elsewhere,[1] but a fuller description may be of interest to those whose work involves frequent determinations of refractive indices.

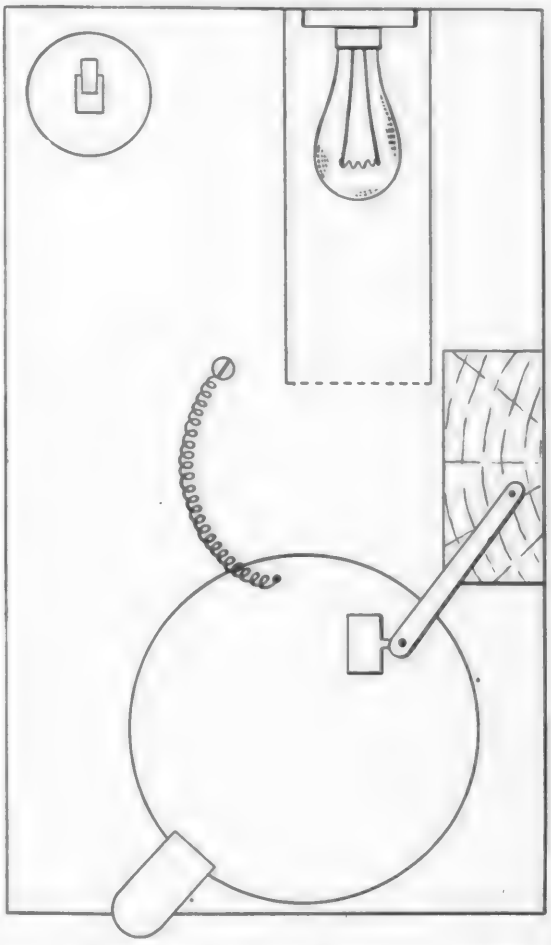
The instrument we are using is of the Abbé type, by Bellingham and Stanley. The operator finds it necessary to rotate such an instrument through approximately 90° after use, to clean the prisms and insert a fresh sample; after which he must readjust the steel mirror below the prisms.

The scale illuminating mirror is also frequently thrown out of adjustment by the movement, and further time is spent in readjustment. The work of lifting, turning and readjusting the instrument, unnoticeable on one or two determinations, becomes extremely fatiguing when hundreds are involved; if the instrument itself is mounted on a gramophone or similar turntable, capable of limited rotation, the prism illuminating mirror fixed separately in a suitable position, and the scale illumination provided by an independent light, the necessity for any lifting or readjustment whatever is avoided.

Construction of Instrument

To construct such an instrument, a closed and rigid box some 20 ins. by 12 ins. by 3 ins. should be made, conveniently of wood; some 5 ins. from one end, the turntable, conveniently from a discarded portable gramophone, should be mounted on the upper surface; the frame of the gramophone motor, mounted inside the box, will give the necessary rigidity. To the turntable should be affixed some form of hand grip, and below it a stud may be fixed which, engaging in a slot or stop blocks in the base-box, limits the angle of rotation to, say, 90°. A spiral spring or similar device is of use to locate the turntable definitely at one or other position. A $\frac{3}{8}$-in. hole, bored as near the centre as possible, will allow the passage of a cable to the scale lamp.

Centrally on this turntable the refractometer should be fixed, two $\frac{1}{4}$ screws tapped through the casting being sufficient (the steel mirror, with its supporting column, should first be removed, and the scale lighting cable passed through the hole previously used for the supporting column). This mirror is then mounted, conveniently on an arm screwed to a wooden block some 3 ins. high on the main base-box. It may be adjusted and fixed permanently so as to give good illumination without coming into contact with any part of the instrument when the latter is rotated with the prisms closed. If the supporting arm is affixed to its block by one screw only, the mirror may be swung out of the way completely for cleaning. A fixed and suitably shielded lamp with switch is attached to the base box.



Plan of base-box, showing turntable, mirror, lamp, and switch.

The scale illuminating light, a small 1- or 2-watt bulb, is attached to the central column of the instrument; a bell transformer in the base box supplies the 3- or 5-volt current for it.

Where, as in the work for which this modification was designed, only an increase or difference in refractive indices is measured, time is saved by adjusting the main scale so that the basic reading is a simple number (1·30 or 1·40)—a matter of slackening the lock nut attaching the scale to the spindle bearing the prism, altering, and retightening.

I wish to thank the Government Chemist for permission to publish this note.

REFERENCE

[1] *J.S.C.I.*, **64**, 55.

Empire Raw Materials

THE Annual Report, 1944, by the Director, Sir Harry Lindsay, K.C.I.E., C.B.E., to the Board of Governors of the Imperial Institute, London, contains among many other matters investigations on agar from Australia, black pepper from Sierra Leone, sunflower seed from Nigeria, and derris root from Uganda.

A sample of agar prepared in Australia from local marine algæ was found to be of satisfactory quality in comparison with the best grades of Japanese agar.

A sample of black pepper from Sierra Leone which it is proposed to market in the United Kingdom was submitted to full analysis. The examination provided some interesting results as regards the content of fixed oil and piperine. The general quality of the pepper was pronounced as good by the trade, and the pepper would be accepted on the United Kingdom market. It is proposed to investigate further productions of Sierra Leone pepper with a view to confirming the analytical figures obtained.

In samples of grey and black sunflower seed grown experimentally in Nigeria with a view to developing an export trade, it was found that the percentage of oil in both types was up to the average figure, and the characteristics of the oils were normal, except the iodine value of the oil from the grey seed, which was rather lower than usual. Enquiries made indicated that suitable decorticating machinery was not then available in this country, but it is understood that steps to provide such plant are contemplated. Hitherto the seed has been taken largely by the Continent, only a small amount for use as bird seed coming to the United Kingdom. It is necessary to carry out the extraction of the oil on the decorticated seed, since the large proportion of husk would otherwise render the residual meal undesirable for feeding purposes.

The production of fruit juices, in its various aspects, has been the subject of a number of enquiries received at the Institute. An Australian firm is reported to be preparing a scheme of production in New Guinea; another with African interests is considering the possibilities of citrus juice extraction in Nigeria; and a well-known firm of fruit juice manufacturers has been assured that empire citrus fruit juices compare satisfactorily in vitamin C content with those from other sources.

Another organisation of firms interested in empire products consulted the Imperial Institute on the subject of West Indian arrowroot and cassava starch, and particulars were given regarding the basis of evaluation of these materials and details of their use were given.

Experimental cultivation in Britain of dandelions grown from seeds sent by the U.S.S.R. after the fall of Malaya have yielded rubber "nearly as good as plantation rubber." The report states that the plants were harvested and submitted to the Institute to study the methods of extracting the rubber and to make a detailed examination of its quality. Suitable methods of extraction were devised, using the rod mill device. The dry roots contained, on an average, up to 10 per cent. of rubber. The yield per acre, however, is much smaller than that of plantation rubber, and the cost of production very much higher. In spite of the rubber shortage, labour and good agricultural land could not be spared in Great Britain to grow the crop on an extensive scale.

Macaroni Manufacture

(*Continued from page 247*)

20 minutes and has the effect of removing the surface dampness from the outside and inside walls of the pieces. Thence the trays are placed in the drying cabinet proper. Here the macaroni is allowed to lie for a time before the drying air is turned on. During this "rest" or "recovery" period the moisture in the heart of the dough emerges on the surface. The macaroni is now ready for the final drying and is subjected for the next 30 hours or so to a steady current of air at 70° F., which completes the drying process. It has been found that any attempt to hasten this by raising the temperature of the air usually produces cracked macaroni.

Low-temperature drying is equally important in the long varieties of macaroni. Here the drying period is more than twice as long as for the cut and is punctuated by times when the air is turned off. This is the tempering process which gives the final article toughness and elasticity. The general effect of this method is to dry the macaroni from the centre outwards.

Macaroni is an article of diet which may increasingly find a place in the kitchens of this country. It may be said to be a pure wheat food, and, with the exception of the water used to form the dough, nothing has been added and nothing taken away.

British Material for Export

Overseas readers are advised that the fact that goods made of raw materials in short supply owing to war conditions are advertised in FOOD MANUFACTURE should not be taken as an indication that they are necessarily available for export.

Trade News

Sir John Orr gives up Post

Sir John B. Orr has resigned from the Chair of Agriculture in Aberdeen University.

Sir John has emphasised that his political career—he was recently elected Independent member for Scottish Universities—has nothing to do with his resignation. He stated that he only occupied the Chair during the war, and as the war is finishing he wishes to make way for a full-time man. Sir John, who recently resigned from the directorship of the Rowett Institute, will continue his association with the North of Scotland College of Agriculture.

* * *

Association of British Insecticide Manufacturers

At the recent annual general meeting of the Association the following were elected as the Officers and Executive Committee for the ensuing year. The offices of the Association are at 166, Piccadilly, London, W. 1.

Chairman: Mr. T. A. Robertson, Plant Protection, Ltd.

Vice-Chairman: Dr. T. F. West, Stafford Allen and Sons, Ltd.

Hon. Treasurer: Mr. E. Z. Bolt, G. H. Richards and Co., Ltd.

Hon. Auditor: Mr. R. V. Craven, W. J. Craven and Co., Ltd.

Executive Committee: Mr. A. F. Berk, F. W. Berk and Co., Ltd.; Mr. E. Z. Bolt, G. H. Richards and Co., Ltd.; Mr. R. A. Blair, Burt, Boulton and Haywood, Ltd.; Mr. E. T. Buggé, Buggé's Insecticides, Ltd.; Mr. H. J. Jones (immediate past Chairman), Hemingway and Co., Ltd.; Mr. J. S. Mitchell, Murphy Chemical Co., Ltd.; Mr. J. E. R. Simons, Geo. Monro, Ltd.

* * *

Dr. T. H. Durrans

We are informed that Dr. T. H. Durrans, D.Sc., F.R.I.C., director of research of A. Boake, Roberts and Co., Ltd., has retired after an association of thirty-seven years with the company. Dr. Durrans, the author of *Solvents*, the sixth edition of which is now in the course of preparation, was also chairman of the London Section of the Society of Chemical Industry in 1939-40 and 1940-41.

Mr. S. V. Poultney

Mr. S. V. Poultney, the late manager of C. and E. Morton's London preserving factory, has been appointed general factory manager at the Lowestoft cannery.

* * *

Sir Jack Drummond

Boots Pure Drug Company, Ltd., announces that Sir Jack Drummond, chief scientific adviser to the Ministry of Food, has been appointed to the post of director in charge of the whole of the company's scientific research. Sir Jack Drummond has resigned the Chair of Biochemistry at University College, London, which he has held since 1922, but he will not take up his new appointment until the food situation has improved.

* * *

Ellison Home Guard awarded D.F.C.

Simultaneous with his release from a German prisoner of war camp, it has been announced that Flying Officer Dennis Perrin has been awarded the D.F.C.

After completing over forty operational flights, Flying Officer Perrin was shot down over Germany in January, 1944, when serving in a "Pathfinder" squadron.

Flying Officer Perrin was employed as a fitter in the works of George Ellison, Ltd., but was later transferred to the staff of the works office. He was one of the first and most enthusiastic members of the Ellison Company Home Guard.

* * *

Change of Address

The address of L. A. Mitchell, Ltd., of 37, Peter Street, Manchester, has now been changed to 3, Oakfield Road, Didsbury, Manchester.

Industrial Pest Control Association

At the recent annual general meeting the following were elected as the Officers and Executive Committee for the ensuing year:

President: Dr. E. Holmes, Plant Protection, Ltd.

Vice-President: Mr. A. F. McIntosh, Thomas Harley, Ltd.

Hon. Treasurer: Mr. S. F. Sprange, London Fumigation Co., Ltd.

Executive Committee: Mr. K. G. Anker-Peterson, British Ratin Co., Ltd.; Mr. F. H. Braybrook, Technical Products, Ltd.; Dr. F. P. Coyne, Imperial Chemical Industries, Ltd.; Mr. G. McLaren, Haller Laboratories, Ltd.; Mr. J. E. R. Simons, Geo. Monro, Ltd.

* * *

Polak and Schwarz

The many friends in the trade will be pleased to hear that the factories and plant of Messrs. Polak and Schwarz at Hilversum and Zaandam are intact. It appears that most of the personnel are suffering from malnutrition, but it is hoped that in a short time production can be resumed on a limited scale, and when raw materials are available again the firm expect to go full steam ahead.

Parts of the premises are at present being used as emergency hospitals for dealing with cases of malnutrition.

* * *

Patra

The Council of Patra is to send a member of the staff of the Printing Division, Dr. G. Macdougall, to the United States of America and Canada. The purpose of the visit is:

1. To enable first-hand contact to be made with scientists engaged on research and development work relating to printing, and to discuss with them problems of mutual interest.

2. To study developments in printing processes and materials.

Mr. A. C. Poulter of the Packaging Division is making a similar visit for the same purpose.

On the return of the aforenamed, a report will be prepared and published for the information of members of the Association.

BTH Lighting Progress

Throughout 1944 the Discharge Lamp Lighting (Control) Order was in operation, and therefore fluorescent lamps continued to be applied mainly to industrial purposes.

Perhaps the most striking feature about the use of fluorescent lamps was the very extensive adoption of continuous troughing installations, largely because this type of installation is unobtrusive in character and makes for very considerable reduction in installation costs. This continuous troughing is available in both single-lamp and two-lamp units.

Another marked feature about the year's work was the increasing preference for lighting fittings giving a fair component of upward light in order to avoid the depressing effect of dark ceilings.

In the earlier part of the war there was a tendency towards the installation of fittings of a strictly utilitarian character. During 1944, however, fittings of a more robust type came into greater favour, possibly because installations completed during the year under review were expected to be used for some considerable time after the war is over.

Although not released to the market until January 1 of this year, mention may be made of the Mazda "Warm-White" fluorescent lamp which was developed during 1944. With the original ("Daylight") Mazda fluorescent lamp, this new lamp now gives an alternative colour of light which, while still apparently white, is of a rather more pleasing shade for office, school, and other lighting applications where the personal element must be taken into consideration.

* * *

Running-in of New Petrol Engines

In nearly all cases a new petrol engine (or other machine) runs stiff because the bearings are slightly too tight, and for running-in the ideal, whether for transport application or stationary sets, is to cause the initial stiffness to disappear as soon as possible whilst postponing to the maximum extent development of the worn-out slackness.

Naturally, the running-in period cannot be unduly prolonged, since it would become uneconomic, and in these circumstances an ideal method is use of colloidal graphite suspended in lubricating oil. Graphite possesses remarkable properties of resistance to heat, chemical action, and pressure—that is, forming a very strong film not affected by the temperatures usually met with in internal combustion engines. Graphite also is itself an efficient lubricant, being in the form of microscopic flat plates which slide easily over one another.

Valuable for the purpose is "dag" colloidal graphite, a production of E. G. Acheson, Ltd., in which the particles are almost molecular in size, so that the graphite remains suspended in lubricating oil or other liquid. One striking result also is that colloidal graphite forms with the metal what is known as the "graphoid surface," being an inert film of microscopic thickness highly resistant to corrosion and general chemical action, while particularly favourable for lubrication. It is in this connexion "dag" colloidal graphite has proved so valuable in preventing the sticking and burning-out of petrol engine valves when using petrol of high anti-knock value containing lead tetraethyl, which on ordinary metal surfaces forms an objectionable and resistant film of lead oxide which hinders lubrication and also transference of heat, thus causing extremely severe local temperature strain.

* * *

Airflex Clutches

Of American origin, having been patented there, Airflex clutches have been proved successful in practically all known applications from small machines to the highest powered presses, oil well machinery, etc.

There are two distinct designs of air clutches, both under the Fawick Patents—one will be known as "Crofts Airflex Clutch" and the other as "Crofts Air Ring Clutch." In both types there are either the internal expanding or outside constricting designs, the class of drive deciding which to install.

The Airflex clutch, besides functioning as a clutch, is flexible in all directions, so that it incorporates all the advantages of a flexible coupling; it is also self-contained.

The Air Ring clutch functions in a similar manner to the Airflex clutch, but its design is entirely different in so far as the friction linings or blocks are not attached to the air bag, the use of the latter being simply to operate the clutch. The drive is taken from the friction blocks through torque bars to the clutch body.

Compressed air is the means of operation; pressures from 60 lb. to 125 lb. or over per square inch are needed.

* * *

Food Machinery and British Export Trade

A company of over one hundred people, representative of the leading manufacturers of food plant and machinery in this country, attended the luncheon given by the Food Machinery Industrial and Export Group at the Savoy Hotel on June 8, with Mr. E. H. Gilpin, chairman of the Group, presiding.

The guest of honour was Mr. Spencer Summers, M.P., Secretary of the Department of Overseas Trade, who was introduced by Mr. Gilpin in the course of an entertaining speech. Mr. Spencer Summers in replying mentioned the first steps in the relaxation of export licensing regulations and announced that other restrictions on export would be removed progressively. He felt assured that the changes would lead to greater flexibility and enable firms to plan ahead with a much greater degree of certainty. A new Order covering manufacturing licences will enable the Government to grant bulk licences to cover both home and export production. Certain hand-operated machines will be released, not only from the intricacies of export licensing as such, but from the manufacturing licence procedure as well.

Sir Samuel Beale, chairman of the Industrial and Export Council, paid a tribute to Mr. Spencer Summers, and said he was confident that manufacturers would obtain the necessary help from the Department of Overseas Trade.

After luncheon, the members of the Group went into conference.

Presscaps

Experience during the war has shown that there are many engineering products—castings, couplings, and machined parts, etc.—having open ends or apertures which are required to be covered for exclusion of dust during transmission of the part, or to be sealed by a replaceable airtight and liquid-tight cover, either temporarily or permanently. There are also engineering products for which a vent or simple type of baffle is required.

For these alternative purposes, the Presscap, the metal replaceable closure well known in use upon oil drums and numerous types of metal and glass containers, etc., has been proved adaptable and thoroughly efficient. The device is made by Press Caps, Ltd.

* * *

Energy Regulator

We have received from Sunvic Controls, Ltd., a copy of their technical publication R.12(a) dealing with the Sunvic Energy Regulator. The principle is now being adopted very widely, and this publication with details of circuits for a wide range of applications should prove valuable. The booklet is available to those interested.

* * *

Aluminium Developments

The first of a chain of Sales and Enquiry Offices for the benefit of manufacturers throughout the country has been opened by Northern Aluminium, Ltd., at 4, Chapel Walks, Manchester, 2. Others will be opened in London, North Wales, the north-eastern area, and Scotland. Arrangements have already been made to deal with enquiries at the company's works at Middlemore Road, Birmingham.

* * *

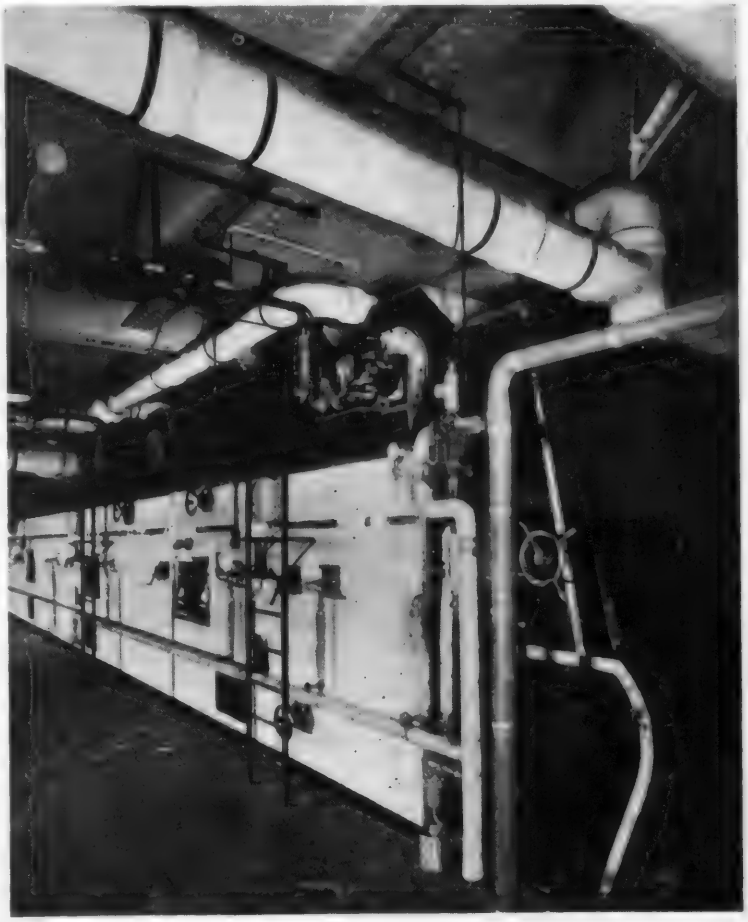
Bread Baking

The most modern type of oven for large scale bread production is the travelling oven, which is semi-automatic in that the bread in tins is loaded by hand from the "proving" machine, travels at a predetermined rate through the heating zones of the oven, and is hand discharged at the outlet end, where it is emptied out of the tins, and placed on band conveyors for removal to the despatch point, or to wrapping machines, if the demand is for wrapped bread.

In the latter event the bread passes through a specially designed cooler, and thence to the wrapping machine, where it is wrapped and sealed in greaseproof paper, so ensuring hygienic conditions throughout the whole process, as the material is not touched by hand from its entry as flour in sacks to its despatch as wrapped bread.

A typical installation of this type is the Baker-Perkins six-sack per hour Cyclotherm Travelling Bread Oven, which is operated in conjunction with their automatic mixing and proving machines.

The oven is of the flat conveyor type, being 6 ft. wide by 60 ft. 6 ins. long, and operated by a motor-driven variable speed gear, which is very accurate in its timing between cycles of 30 and 50 minutes' duration. The burner equipment is of the Baker-Perkins—Keith Blackman design, and is mounted on the top of the oven in three independent units, each having a maximum consumption of 1,000 cubic feet of gas per hour and firing into separate combustion chambers, from which the heat is withdrawn and circulated through the heating zones by hot gas fans, each zone being separately and thermostatically controlled against the required oven temperature, there being no contact of combustion gases with the product travelling through the oven. An interesting feature of this particular oven is that it is arranged to operate on town's gas supply governed down to a pressure of 0·5-in. w.g.



New Industrial Projects

The provision of a factory at Keith and the erection of new premises at Fraserburgh for freezing herring are included in a schedule of new industrial projects approved recently by the Regional Board for Scotland.

* * *

Citrus Fruit Juices Control

The application of Clause 21 providing for cases of hardship caused by operation of the scheme is at present confined to datum period importers only.

The Advisory Committee feel that this is too narrow, particularly in view of the fact that when the scheme is wound up cases of hardship may arise affecting other classes of participants. Moreover, it is possible that contingencies which could not be foreseen when the scheme was drawn up three years ago may arise before its termination. Therefore, in order to safeguard the position of all participants the Advisory Committee, with the agreement of the Ministry of Food and by virtue of their powers under Clause 25, have amended Clause 21 to provide for this situation.

Since the clause as re-drafted widens and increases the responsibility of members of Allocations Control in circumstances which cannot be foreseen, opportunity has been taken in a new Clause No. 28 to define clearly the position of members of the Control. The Advisory Committee will, of course, continue as hitherto to act in an entirely honorary capacity.

Clause 21 of the scheme as amended will therefore now read:

"*Hardship and other Contingencies:*

"Any participant in the scheme who can prove that he has suffered hardship through its operation may apply to the Allocations Control for compensation. Applications stating the ground thereof and supported by appropriate data should be made not later than the 28th February in the year following that in which the hardship is alleged to have been incurred. The applicant may be called upon to furnish to Allocations Control any additional information and particulars in regard to which independent evidence and/or certification may be required. The amount of any compensation granted will be at the sole discretion of Allocations Control. Allocations Control may also at their sole discretion make any payments from the funds provided by the comprehensive charge in dealing with any contingencies arising out of the operations of the scheme."

Clause 28 of the scheme will read:

"*Liability of Members of Allocations Control:*

"No individual or collective liability shall attach to any person serving as a member of Allocations Control (including the Accountants) by reason of any obligation, decision, payment or act which may have been or may be undertaken, made or done by Allocations Control during the operation of the scheme."

* * *

X-Ray Analysis in Industry

The X-ray Analysis Group of the Institute of Physics held its 1945 Conference in London recently. The Conference was opened by Professor Sir Lawrence Bragg, O.B.E., F.R.S., the Chairman of the Group. On the subject of the equipment of X-ray laboratories, papers were read by Dr. R. F. Hanstock, Mr. H. S. Peiser, and Dr. W. A. Wooster. Dr. Hanstock, of High Duty Alloys, Ltd., dwelt specially on equipment for determining residual stresses in metals. Mr. Peiser, of Imperial Chemical Industries, described a number of types of X-ray apparatus of wide applicability, and Dr. Wooster, of the Department of Mineralogy and Petrology at Cambridge University, described chiefly the accessory crystallographic equipment that is necessary in addition to the X-ray apparatus.

During the Conference, Professor J. D. Bernal, F.R.S., gave a talk on the Future of X-ray Analysis. He foresaw great developments in automatic and semi-automatic apparatus to cut down the labour of crystallographic analysis, and that applications of X-ray analysis would overshadow interest in it for its own sake. X-ray diffraction outfits would become obligatory in all industrial, biological, and chemical laboratories of any size.

The annual general meeting of the Group was held on the first day of the Conference. Professor Sir Lawrence Bragg was re-elected Chairman, and Mr. F. A. Bannister, of the Minerals Department, British Museum, was elected Honorary Secretary of the Group. The Committee for 1944 was re-elected to serve for 1945.

OBITER DICTA

- No imported foodstuffs will be issued to the German people except in extreme urgency.—*Mr. Arthur Henderson.*
- I hope this food question will not enter into the political arena.—*Col. Llewellin, Minister of Food.*
- Children who can't spend their "Saturday penny" on sweets because of rationing are being exploited by ice-cream vendors.—*Glasgow Food Office official.*
- Advertising has lost the haphazard approach that it used to have in the early days and has become a scientific study.—*Sir Miles Thomas.*
- Look how even to-day they (the Socialists) hunger for controls of every kind, as if these were delectable foods instead of war-time inflictions and monstrosities.—*The Prime Minister.*
- I suggest that payment for all overtime worked in the production of food between, say, June 1 and November 1 should be tax free, for one year at least.—*Letter to "The Times."*
- I know a grocer who is unable to obtain his supply of Grade 1 tinned salmon as he was told it was all "earmarked" for an Italian prisoners of war camp.—*Letter to "The Daily Express."*
- You fetch some of them fellows from Cornwall here. We'll show them how to make a fair life with no headaches out of fishing.—*Rye fisherman alluding to the members of Fisheries' Organisation Society.*
- We have pandered to the public too long; I do not see why, at the beck and call of every Tom, Dick and Harry, we should keep open all day and half the night. I am not going to do it.—*A member of the Croydon N.U.R.C.*
- So much that is unique in our national life is derived, even if unconsciously, from what are perhaps the Englishman's strongest passions, the love of nature, the things of the open air and the countryside, and the love of gardening.—*Mr. C. J. Layton in a Chadwick Lecture.*
- I can only suppose that the whole phytic acid theory is a figment of the imagination. Clearly, too, the authorities themselves do not believe in it; for I understand that the calcium is still being added to the much whiter bread eaten at present.—*Dr. I. Harris.*

Company News

Heenan and Froude—I.W.E.L. Amalgamation

We are advised by Heenan and Froude, Ltd., of Gloucester, that they have acquired the controlling interest in Industrial Waste Eliminators, Ltd., of London and Baldock, a firm which has for many years conducted a highly specialised business in machinery and equipment for complete slaughtering, dressing, and processing equipment for abattoirs, meat-packing houses, bacon factories, sausage and provision works, and has also the "Iwel-Laabs" dry rendering process for edible fats, lard, technical fats, inedible by-products, bones, condemned meat, and offal, etc., fish meal and oil production plant, oil and waste saving plant. The operations of Industrial Waste Eliminators, Ltd., will continue under the existing management and staff with Mr. Jean Schmidt (Managing Director), and the Board will be joined by Mr. W. M. Ratcliffe (Chairman), Mr. W. M. Good and Mr. W. O. J. Urry, appointed by Heenan and Froude, Ltd.

The Preference shares in Industrial Waste Eliminators were acquired for cash, and the Ordinary shares on the basis of an exchange of nine 5s. Ordinary shares in Heenan and Froude for each £1 ordinary share in I.W.E.L.

The latter company has for a number of years paid a consistent dividend on its Ordinary shares, greater than the dividend which would have been paid on the Heenan and Froude shares given in exchange.

Heenan and Froude have also acquired for cash the business of the New Destructor Company, Ltd., of Pershore, an old-established firm with important connexions and interests in the refuse disposal business. The fusion thus effected will ensure a further vigorous policy in all forms of municipal, industrial, and institutional refuse disposal matters, the field of interest covered by the New Destructor Company, Ltd., being complementary to the range of products hitherto operated by Heenan and Froude, Ltd. Two of the existing Directors of the New Destructor Company, Ltd., Mr. H. M. Hutchinson and Mr. J. L. Bates, will continue to act as Directors, together with the Heenan and Froude representatives as above.

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Lipton

Lipton announces a dividend of 8 per cent., less tax (same). Profits for the year to December 30, 1944, after charging debenture interest and dominion and foreign taxation, amount to £303,424, as compared with £228,368. Provision for U.K. taxation is £230,000, as compared with £170,000.

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Home and Colonial

Home and Colonial Stores is to pay a dividend on the Ordinary shares of 8 per cent. (same), less tax at 9s. 3½d. The combined profits of the company and its subsidiaries for the year to December 30 amount to £1,349,378, as compared with £1,267,369 for 1943. Provision for U.K. taxation amounts to £1,010,402, as against £969,707.

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United Canners, Ltd.

The thirteenth ordinary general meeting of United Canners, Ltd., was held on May 31. The chairman, Mr. Joseph B. Dring, in his statement said that the sales in 1944 showed a considerable increase on the previous year, and the net profits, before taxation, were increased from £24,165 to £30,134. The Board recommended a dividend of 10 per cent., less income tax. The capital of the company is being increased to £210,000 by the issue of 280,000 shares of the nominal value of 5s. each at 7s. 6d. a share as the purchase price of the Ordinary share capital of J. and J. Beaulah, Ltd., whose shares are being purchased. J. and J. Beaulah's average profits, before taxation, for the four years ended April 30, 1944, were £85,000 per annum, with an E.P.T. standard of approximately £14,000. Results achieved for the year to April, 1945, show a profit in excess of £30,000.

Joseph Travers and Sons

The accounts of Joseph Travers and Sons, importers and wholesale grocers, for the year to January 27, show a trading profit, after tax, of £57,892 against £53,373.

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Spillers

Profit and loss accounts for the years to January 31, 1943-1944, with the comparative figures for 1941-42, have been issued by Spillers, the flour millers. Net trading balance for 1943-44 was £669,078, against £617,538 for 1942-43 and £582,103 for 1941-42. Investment income was £36,770, £48,337, and £91,582, making a profit for 1943-44 of £705,848, against £665,875 for 1942-43, and £673,685 for the year before.

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Cerebos, Ltd.

At the forty-first annual general meeting of Cerebos, Ltd., held on May 16, Sir William Collins, chairman and managing director, announced that the profit for the year before income tax was £440,762, an increase of £30,259, and after making full provision for income tax there remained the sum of £201,464, which enabled them to recommend the usual final dividend of 30 per cent. (less income tax), making, with the interim dividend already paid, 40 per cent. for the year, and to carry forward £73,746, against £72,282 brought in.

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Burton Son and Sanders

A very consistent level has been maintained by the profits of Burton Son and Sanders, the sugar refiners and wholesale grocers, for several years past. The record was fully kept up last year, with a net profit of £49,600, only a few hundreds below the previous period. The dividend is again 10 per cent. on the Deferred Ordinary shares, while the 8 per cent. Preferred Ordinary get an additional 8·485d. per share, equal to approximately 3½ per cent., now paid regularly since 1933-34. The balance of £40,500, or £2,300 more, is carried forward.

Overseas Items

Combined Food Board

Mr. L. A. H. Peters and Mr. E. C. Zimmerman have been appointed Netherlands representatives on the Fats and Oils Committee and the Coffee, Cocoa, and Spices Committee respectively of the Combined Food Board, U.S.A.

This Committee has been a most useful mechanism in the distribution of food resources among the various United Nations, according to a statement announcing its decision to maintain the board until the end of the Japanese war.

On the basis of detailed information interchanged constantly among its commodity committees, the board has developed many international plans for meeting the increased war demands and offsetting as far as possible the early loss to the enemy of important items.

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U.S. Foreign Fact-finding Service

The United States, through the joint action of the Departments of State and Agriculture, is now strengthening and broadening its world-wide agricultural fact-finding service at U.S. Embassies, Legations, and Consulates.

Seventy-one senior agricultural experts have already been assigned as agricultural attachés to forty-seven countries. Additional men will be sent out as the need arises for their services. An official of the Office of Foreign Agricultural Relations in the Department of Agriculture said: "The agricultural technicians, all of whom have been selected for their extended experience in the dominant agriculture of the country to which they are assigned, will carry out a three-pronged programme. First, they will have the continuing job of reporting on agricultural production and demand; secondly, they will serve as technical advisers to U.S. Ambassadors and Ministers and be ready, if requested, to contribute their knowledge to foreign governments with whom they are associated; thirdly, they will regularly report governmental policies affecting agriculture."

It was emphasised that this was not a programme directly connected with relief or rehabilitation, but rather a long-term co-operative effort, purely advisory in nature.

Regular reports on agricultural matters from the United States will be made available to interested government agencies in foreign countries. Books, circulars, magazines, motion pictures, and other material dealing with agriculture will be placed in U.S. Embassy, Legation and Consulate libraries for reference purposes. The skill and experience of the agricultural officers on duty abroad will at all times be at the disposal of foreign governments.

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Lord Luke's Cure for Meat Shortage

Lord Luke of Pavenham, who has been trying to arrange increased beef exports to Britain, and has just completed five weeks' study of the Argentine meat situation, said on his way home:

"The Argentine is still living with a pre-war conception of the quality of beef. This is right if only breeding is considered, but if producers would turn their minds to quantity and weight instead of perfect baby beef it would see the end of the meat shortage in England.

"The shortage outside the Argentine does not exist inside the country, as Argentines eat 75 per cent. of the meat they produce."

Reuter adds: During January and February the export of fresh and tinned meat from the Argentine fell 63 and 30 per cent. respectively, according to the official figures.—*Reuter.*

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Butter in Rhodesia

Mr. Leslie Fereday, Rhodesia's Minister of Supply, announced that from the beginning of June, Rhodesia was to have one week without butter each month for five months because the butter position in the country is very difficult.—*Reuter.*

World Demand for Sugar Machinery

Victory in Europe has increased rather than diminished the world-wide demand for sugar machinery, members of the sugar machinery and equipment advisory committee said at a meeting at Washington, it was reported by the War Production Board.

The report on production this year shows that, in the first quarter, the industry had shipped 911,400 dollars worth of machinery. On March 31 the industry had a backlog of orders valued at approximately 3,000,000 dollars.

The committee declared that all indications point to a post-war expansion of the sugar industry, especially in South America and Mexico, with greatly increased demand for sugar machinery.—*Reuter.*

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Electronic Thermometer

An electronic type resistance thermometer for indicating, recording, and controlling temperature from −100° F. to 1,000° F. is being manufactured by the Bailey Meter Co., Cleveland, Ohio. The recorder operates on the null balance principle and is said to provide instantaneous balancing action by electronic detection and control. Reliable performance and accurate calibration over long periods of continuous operation are claimed as a result of the unit's sturdy design.

Thermometers may be secured with as many as four recording units, each provided with its own continuously connected control unit and measuring bridge. This feature is said to ensure instantaneous response to changes in temperature.

Bailey air-operated control, electronic control or contacts for on-off electric control may be provided for two temperatures by the multiple-pen Bailey electronic recorder-controller. The control mechanisms required are mounted inside the recorder-controller casing and are actuated by the same reversible motors which drive the recording pens. Alarm contacts may be provided for any or all of the recorder units.

Food in Holland

Brigadier Webb has given instances showing that except for the V-2 areas the Dutch food position was better than had been expected.

In Friesland, for instance, he estimated that there were 25 per cent. more cattle than before the war. During May, 2,400 tons of cheese and 1,000 tons of butter will be produced in Friesland—more than all Holland ate in a month before the war—while in June the figures will increase to 2,500 and 1,500 tons respectively.

The difficulty at present is to supply the Dutch with sufficient coal to provide power for processing. Six hundred tons of coal a day is being provided against the Dutch request for 16,000 tons. The coal is Dutch, from the Maastricht area.

In Zutphen the ration before the liberation was 650 to 700 Calories a day and is now about 1,700.

Canadian Civil Affairs units which bring in food supplies stay until the Dutch take over.—*Reuter.*

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Spanish Apricots for English Jam

A contract has been signed in Madrid for the purchase by the British Ministry of Food of 9,250 tons of Spanish apricot pulp for £400,000. The pulp will be canned in tinplate supplied by Britain. Packing will begin at the end of this month and the pulp will be shipped from Cartagena and Alicante in British vessels.—*Reuter.*

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Air Liner Meals

The American United Air Lines is making extensive studies in a crude wooden model of the four-engined Douglas 44- to 56-passenger planes which it has ordered for the post-war period. In the picture employees serve as "guinea-pigs" in trying out new ideas in meal service. Stewardess Jean MacDonald serves a hot, full-course meal as Mrs. Jean Arbogust, United's dietitian, gets comments from the "passengers." Meanwhile, United is soliciting ideas from the public through circulation of a questionnaire booklet covering all kinds of food and service facilities.

Russians to Grow Oranges and Dates

The Soviet expedition which was sent into Persia and Iraq to study varieties of sub-tropical plants growing in those countries and the suitability for transplanting to sub-tropical regions of the Soviet Union has now returned to Moscow.

They brought 20,000 cuttings of pomegranates, 10,000 cuttings of date palms, hundreds of cuttings for growing oranges, lemons, and other citrus fruits, 4,000 cuttings of grape vines, half a ton of almond and olive seeds, 1,500 cuttings of sugar cane, quantities of date palm seeds, seed grain, and more than 100 different kinds of vegetable seeds, including 25 varieties of peas and beans.

Much of this, already planted in the south, is said to be doing well.—*Reuter.*

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Margarine and Dairy Products

Dr. A. J. Norval, Chairman of the Board of Trade and Industries, said at the first annual dairy industry dinner in Johannesburg: "Although the proposed marketing of margarine has aroused a measure of apprehension in your industry, it is my conviction that its production will in no way detract from the value of the commodity which you manufacture." The sale of margarine would stimulate the demand for dairy products. It could not replace the natural commodity, but would increase the efficiency in the industry and lower costs. If native labour were drawn into the industry a wider market would be created for these natural products, and he looked forward to the day when they would not be exported.

Mr. J. W. Lobban, who presided, said he was confident the progress made by the industry during the past twenty years would be repeated in the next ten years. Control had brought a great measure of stability, and a levelling of prices had brought their products within reach of earning groups throughout the year.

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N.Z. Honey for Britain

Britain has asked New Zealand to provide up to 300 tons of honey for her essential needs of food this year, said Mr. Ben Roberts, Minister of Marketing and Agriculture.

He added that it had been impossible to send honey to Britain during the war due to the strain on shipping, but that he was sure New Zealand beekeepers would do all they could to meet the mother country's request—*Reuter.*

Mrs. Jean Arbogust gets comments from the "passengers."

News from the Ministries

Chocolate and Cocoa Products

The Minister of Food has made an Order, S.R. & O. 1945, No. 598, amending the Chocolate, Sugar Confectionery and Cocoa Products (Control and Maximum Prices) Order, 1944, by making variations in the list of medicated products whch are regarded as sugar confectionery but are not subject to personal points rationing.

Milk Powder for Manufacture

The Ministry of Food states that in accordance with the announcement made by the Minister on May 22, allocations of milk powder for the following manufacturing uses will, after the completion of current issues, be discontinued until further notice:

Bakers' Prepared Materials, including Synthetic Cream and Filling Cream.
Biscuit and Flour Confectionery.
Chocolate and Sugar Confectionery.
Ice Cream.
Ice Cream Mixes and Powders.
Vegetarian Foods.

The Labelling of Food (No. 2) Order, 1944

The Labelling of Food (No. 2) Order 1944 came into force so far as sales by manufacturers and packers are concerned on May 1, 1945, and wholesalers are reminded that any pre-packed foods which do not comply with its requirements may not be sold by them on or after August 1, 1945. Wholesalers are therefore advised to see that their stocks are turned over so as to clear all incompletely labelled goods before that date.

Where the wholesaler is himself the pre-packer of the food it should be noted that he may not sell it incompletely labelled after May 1, 1945. On the other hand, if the wholesaler is also a retailer he may sell—but by retail only—incompletely labelled foods up to November 1, 1945, whether he has pre-packed them himself or purchased them already pre-packed.

The Ministry of Food is empowered to authorise the use for a limited period of existing stocks of labels which do not comply with the Order. Such authorities will only be given in exceptional cases, such as where stocks of labels and packing material have been "frozen," and if the public is not prejudiced. In such cases the authorisation issued to the manufacturer or packer will cover subsequent holders of these goods for three months in the case of other sales by wholesalers and six months in the case of sales by retail after the date up to which the packer is authorised to sell them.

Accordingly, a wholesaler before accepting pre-packed goods which do not comply with the Order, should require—

(*a*) a warranty that the manufacturer or packer has been authorised by the Ministry of Food to sell them incompletely labelled, and (*b*) notice of the dates up to which the authorisation is effective,

and should satisfy himself that taking into account his existing stocks he will be able to clear all incompletely labelled goods by the appropriate dates.

In due course similar advice will be given to retailers, and for the guidance of the trade it is proposed to publish a schedule showing how the various pre-packed foods are affected by the Order.

Wholesalers who are in doubt as to the application of the Order should write to the Standards and Labelling Division, Ministry of Food, Norfolk House, Colwyn Bay, N. Wales.

New Bull Licensing Regulations

The Minister of Agriculture has made new Regulations governing the licensing of bulls in England and Wales which came into force on June 24.

After that date there will be three types of licence—namely,

(1) Beef Bull Licences for bulls entered in the pedigree register of approved beef breed societies or bred from parents in the pedigree register or grading-up register of such societies.

(2) Dairy (official milk record) Licences for bulls whose dams and sires' dams have official milk recorded yields of at least 600 gallons with the first calf or 700 gallons with the second calf or 800 gallons with a subsequent calf in a lactation period of not more than 365 consecutive days.

(3) General Class Licences for bulls which are found to be suitable as regards their conformation, freedom from disease and power to beget satisfactory progeny, but are unable to fulfil the special additional requirements for a Beef or Dairy Licence.

Cross-bred bulls will no longer be licensed, but non-pedigree pure-bred bulls or bulls whose ancestry is not entirely confined to one breed but nevertheless conform to the standard of type of a recognised breed may still be granted a licence.

Appointment

The Minister of Food, Colonel the Rt. Hon. J. J. Llewellin, C.B.E., M.C., T.D., M.P., has appointed Captain W. P. Sidney, V.C., M.P. (Chelsea), to be his Parliamentary Private Secretary.

Mr. W. D. H. McCullough

In view of the General Election, Mr. W. D. H. McCullough, the prospective Conservative candidate for the King's Lynn Division of Norfolk, has resigned from the position of Public Relations Officer to the Ministry of Agriculture.

Resignation of Mr. J. F. Knight

At the request of Unilever, Ltd., the Minister of Food has, with regret, agreed to release Mr. J. F. Knight, Principal Assistant Secretary, General Department, from his post. The Minister desires to take this opportunity of expressing his appreciation of Mr. Knight's services to the Ministry.

Importation of Plants, etc.

In view of the existence of the Colorado beetle in Portugal, a new Order entitled the Importation of Plants (Amendment) Order of 1945 has been made by the Minister of Agriculture and Fisheries under the Destructive Insects and Pests Acts, 1877 to 1927. The Order came into operation on June 5, 1945, and imposes on the landing in England or Wales of plants, potatoes, raw vegetables, and cider apples grown in Portugal, restrictions similar to those applied to similar products grown in certain other European countries in which the Colorado beetle has established itself.

Copies of the Order (S.R. & O. 1945, No. 583) may be obtained from H.M. Stationery Office, price 1d. net.

Bloaters, Bucklings, and Kielered Sprats

The Minister of Food has amended the Fish (Maximum Prices) (No. 2) Order, 1944, in order to prescribe new maximum prices for bloaters, bucklings (cooked smoked herrings) and kielered sprats (cooked smoked sprats). The new Order came into force on June 3, 1945.

The Order defines "bloatered" as meaning dry salted or pickled and subsequently smoked by wood smoke. The lower prices till now prescribed for bloaters have not encouraged this form of processing, but with the expected resumption of the East Anglian herring fishing next autumn, it is hoped that the production of bloaters at Yarmouth and Lowestoft will be revived.

Bucklings and kielered sprats are herrings or sprats which are brined and then "hot smoked"—*i.e.*, subjected to heat treatment in an oven. The new prices will enable these articles to be produced at a reasonable profit.

Information and Advice

Glacé Cherries

9,827. *Required recipe for glacé cherries.* (S. Africa.)

The following is a recipe for glacé cherries, which is given as a basis for experiment :

The cherries are first exposed to sulphur fumes for about 5 hours in a sulphur cabinet. They are then put in wooden buckets covered with water in which 1 oz. of sulphite of soda to each 20 quarts of water has been dissolved.

The cherries are pitted and blanched and kept in cold running water for about an hour. The fruit is then allowed to dry out on hurdles. The canning is done by glacing the cherries in earthenware jars and pouring a syrup of 22° Beaumé over them (when boiling), leaving 1 hour, then draining the syrup and boiling to 24° and again pouring over the cherries. Leave for 24 hours, drain the syrup and sugar, and boil to 25°, pouring over the cherries. Repeat the operation three times more every second day. The strength of the syrup is then to be increased to 27°. Three days later drain and increase to 28°. Three days later increase to 30°, adding to the syrup a small quantity of carmine to colour the cherries red. Resume the draining four days later, boiling the syrup at 32° by addition of glucose instead of sugar. Repeat this operation twice. At the next boiling increase the strength of the syrup to 33° by adding more glucose. This operation is repeated until the syrup is found to remain at 33° after four days' contact with the fruit, which will show that they have absorbed all the sugar possible. The cherries should then be transparent and full of light and colour.

Ham Canning

9,637. *Required information regarding special precautions to be taken in ham canning.* (Australia.)

We do not know the special points you have in mind, but without attempting to cover the whole process the following hints may help.

On arrival at the factory it should be made sure that the legs of pork are in good condition, free from bruises, and of the right cut. They should be trimmed immediately and hung in the freezer with a fan on. When they reach a temperature of 35-36° F. they are ready for curing, except that they should be previously rubbed in salt.

Legs must not be packed too tight in the brine, which should be cooled to 35° F. The temperature is important, as if the brine or legs are too warm the legs adhere to each other, thus producing the risk of taint. After curing, the legs are scrubbed in several changes of lukewarm water.

Having been dried, smoked, boned, and pressed, the legs are ready for canning. Extreme care must be taken at this stage. Hams must have a glove-like fit and spaces at the corner of the can avoided. If no power press is used the hams should be weighed before putting into the can, each size taking a certain weight. After cooking they can either be pressure-cooled or sprayed prior to being placed in the cooling chamber.

Information Supplied

10,003. *Names and addresses of the makers of* (a) *engine sprayers for fruit trees and* (b) *injectors for the manuring of fruit trees.* (France.)

10,004. *Required information of the manufacturer of a mincing machine.* (Australia.)

10,005. *Required literature covering the manufacture of fish paste and a formula for custard powder.* (Australia.)

10,006. *Information required regarding food factory disinfection and also emulsifiers.* (U.S.A.)

10,011. *Names of manufacturers of canning machinery, fish paste mixing machines, and fish meal plant.* (Scotland.)

10,012. *Names of firms manufacturing machinery for packing jelly crystals, custard powder, coffee essence, flavouring essence, mixed spice, cordial extract, and confectionery.* (Australia.)

B. 100. *Information regarding boiler units.* (Yorks.)

B. 101. *Names of manufacturers of a test baking oven, temperature controlled for temperatures up to 110° C., for 230 volts A.C., suitable for six trays size 24 ins. by 18 ins. by 2½ ins. deep.* (London.)

B. 105. *Information regarding the current trade price of starch and wheat gluten.* (Norfolk.)

B. 106. *Information concerning vacuum drying plants, as used in food processing.* (London.)

B. 115, *and others. Manufacturers of the plant used in "A New Canning System," described in* FOOD MANUFACTURE, May, 1945. (Glasgow, etc.)

B. 123. *Names of suppliers of hasher knives and plates for mincing machine.* (Yorks.)

B. 124. *Names and addresses of firms manufacturing plant for sealing tins of food such as coffee, etc., while under vacuum.* (Warwicks.)

B. 125. *Names and addresses of manufacturers of sheet stainless steel, suitable for table tops.* (Lancs.)

B. 127. *Information regarding manufacturers of stainless steel tanks of 150, 350, and 500 gallons capacity fitted with beaters or agitators for making fruit squashes and sauces.* (Middlesex.)

Information Required

B. 129. *Name and address of manufacturers who produce a paint or wash for ends of casks after they are filled with fruit pulp. Also of manufacturers of round metal bung seals.* (Eire.)

B. 149. *An enquirer wishes to be put into touch with anyone interested in wheat alcohol production either in this country or abroad.* (Norfolk.)

B. 180. *Name and address of suppliers of a mechanical device or equipment for extracting fats from barrels and casks while the material is in the package, after removing the two heads, or alternatively after the package has been stripped.* (Cheshire.)

B. 181. *Name and address of manufacturers of a spraying machine for coating cartons with paraffin wax.* (Wales.)

Recent Patents

These particulars of new patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Abstracts of Recent Specifications

An Improved Method of and Apparatus for Packing or Canning Food and other Plastic Substances

The method of the invention consists in telescoping a can or other receptacle, which may be a paper wrapper or cup, or other container, over a freely supported extrusion die containing a plurality of open-ended elongated passages through which the plastic substance can be extruded, the can, cup, wrapper, or other receptacle being telescoped over the die until the base of the receptacle contacts the end face of the die, whereupon the plastic substance is pressed through the die, causing the extruded material to press the receptacle outwards away from the die until the desired length of sausages has been extruded from the die, whereupon the pressure on the plastic substance entering the die is released and a cutter is thereafter moved across the end face of the die to sever the sausages, leaving a plurality of skinless or casingless sausages of the plastic substance within the can, wrapper, cup, or other receptacle.

Separate cans or like containers may thus be filled one after another in rapid succession with skinless sausages, and the cans or like containers may be sealed in known manner. If the sausages are to be preserved in sealed cans or like containers, the sausages in the cans must be slightly shorter than the depth of the can. This necessitates the severing of the material exuding from the die before the can completely leaves the die, and for this purpose it is necessary that an internally operating cutter be employed, which will operate within the can when the latter has been nearly filled. A cutter suitable for this purpose and capable of operation from outside the die is disclosed in a prior patent, No. 543,452.

The invention can be applied in like manner to the filling of cartons or cups made of paper, pulp-board, or like material, the carton or cup being subsequently closed or sealed with a cap or cover. It also enables wrapped packages of skinless sausages to be produced in a rapid and simple manner by simply filling a can, cup or like receptacle with a plurality of skinless sausages in the manner already described, then emptying the pack of sausages out of the can or the like and wrapping the pack in wrapping paper or other suitable wrapping material. Thus the same can or like receptacle can be repeatedly filled and emptied, the packs of sausages emptied from the can or like receptacle being subsequently wrapped.

The invention further contemplates the provision of means for canning sausages or for producing packs of sausages all of a predetermined weight, determined by the length of material exuded from the die in forming a pack. *567,045. William Muir Yuill.*

Specifications Published

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

567,305. CANNON IRON FOUNDRIES, LTD., CLAYTON, R. T., and OATLEY, A. F.: Combined combustion chamber and heating plate for gas-fired cooking apparatus.

567,323. SHIRLEY AND CO., LTD., R. L., GREGORY, A. D., and SEARLES, C. E.: Boxes, cartons, or like containers.

567,376. JESSOP, J. A.: Manufacture of bread and confectionery.

567,607. KORNFELD, W.: Tin-openers.

567,706. KLEEN, N. E. AF.: Refrigerating apparatus.

567,712. CONTINENTAL CAN CO., INC.: Methods of and apparatus for hermetically closing containers for food.

567,741. DIXON, E. K. PORTMAN-: Means for delivering liquids in measured quantities.

567,791. UNGER, M. L.: Apparatus for removing eyes and other blemishes from potatoes or other root vegetables and fruits.

567,793. HELLER, B.: Method of preserving meat.

567,857. RITTER, E. A., and LIPSCHITZ, C.: Process for predigesting cattle foods, and the products obtained thereby.

567,873. ROGERS, G.: Washing-machines for bottles or like containers.

567,928. MILLARD BROS., LTD., and BATER, C. C.: Device for removing stones from fruit.

567,992. FEAR, E. D.: Manufacture of ice cream.

567,999. DAVIS, W., and JONES, H. S.: Tool or implement for the use of farmers, gardeners, and others.

Trade Marks

The list of trade marks of interest to readers has been selected from the "Official Trade Marks Journal" and is published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

PIE-MAN.—624,776. Self-raising flour for sale in Anglesey and the counties of Caernarvon, Denbigh, Flint, Merioneth, Montgomery, Chester, Cumberland, Lancaster, Warwick, and Worcester, and the West Riding of Yorkshire. **British Flour Products, Ltd.,** Crawford Road Mills, Crawford Road, Wigan; Manufacturers.

PROMAL.—627,911. Preparations containing malt constituents, for use in baking. **Wheta, Ltd.,** 1 to 5, Calvin Street, Belfast, Northern Ireland; Manufacturers.

GATOMA.—630,810. Flour, custard powder, baking powder, cooking essences (not being essential oils), and golden raising powder, being an aerating preparation for use as an ingredient in food. **Royal Albert Dock Mills, Ltd.,** 56, Short's Gardens, Kingsway, London, W.C. 2; Flour Importers and Exporters.

LAKEFRUIT.—631,060. Sauces containing fruit. **Lakeland Food Industries, Ltd.,** Solway Estate, Maryport, Cumberland; Merchants and Manufacturers.

New Companies

C. Goodall and Sons, Limited. (390395.) 112, Green Lane, Derby. To take over from Chas. Goodall certain inventions relating to the drying of grain, seeds, foodstuffs, fibres, minerals, leaves, flowers, and timber, etc. Nom. cap.: £10,000 in £1 shares. Dirs.: C. Goodall, Anslow House, Anslow, near Burton-on-Trent; J. S. Clarke, Broadhurst Manor, Horsted Keynes, Sussex.

Head Wrightson Processes, Limited. (390403.) To carry on bus. of inventors, designers, consulting engineers, chemists, and consultants, etc. Nom. cap.: £50,000 in £1 shares. Dirs.: Sir G. T. Wrightson, R. Miles (ch.); Major J. G. Wrightson, K. W. Hickman, H. Harper, R. C. Fisher, and S. T. Robson, addresses not stated. Subs.: T. G. Greenleaf, 31, Oakdene Road, Sevenoaks (clk.); Ivy E. Flook, 2a, Toronto Avenue, E. 12 (clk.).

Taken from the Daily Register, compiled by Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C. 2.